The Tool Engineer

(Trade Mark Registered in U. S. Patent Office.)

November
936

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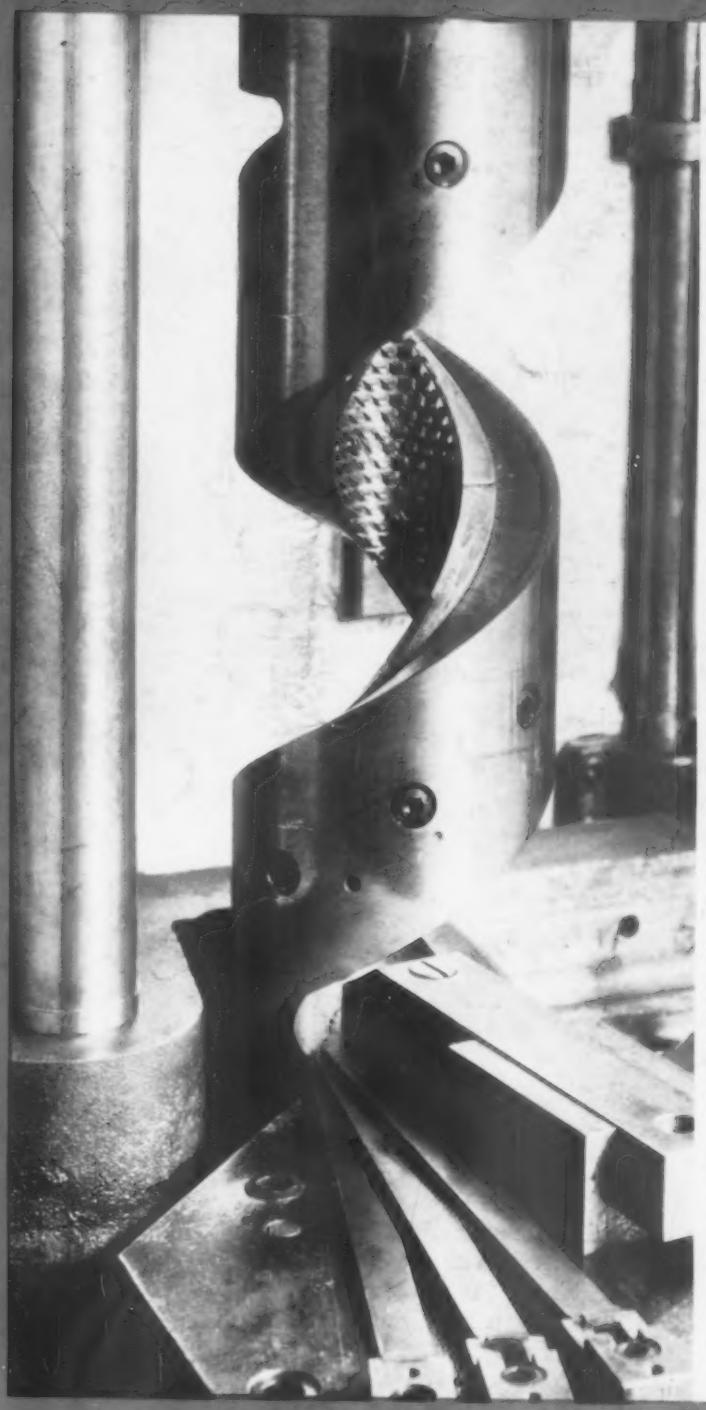

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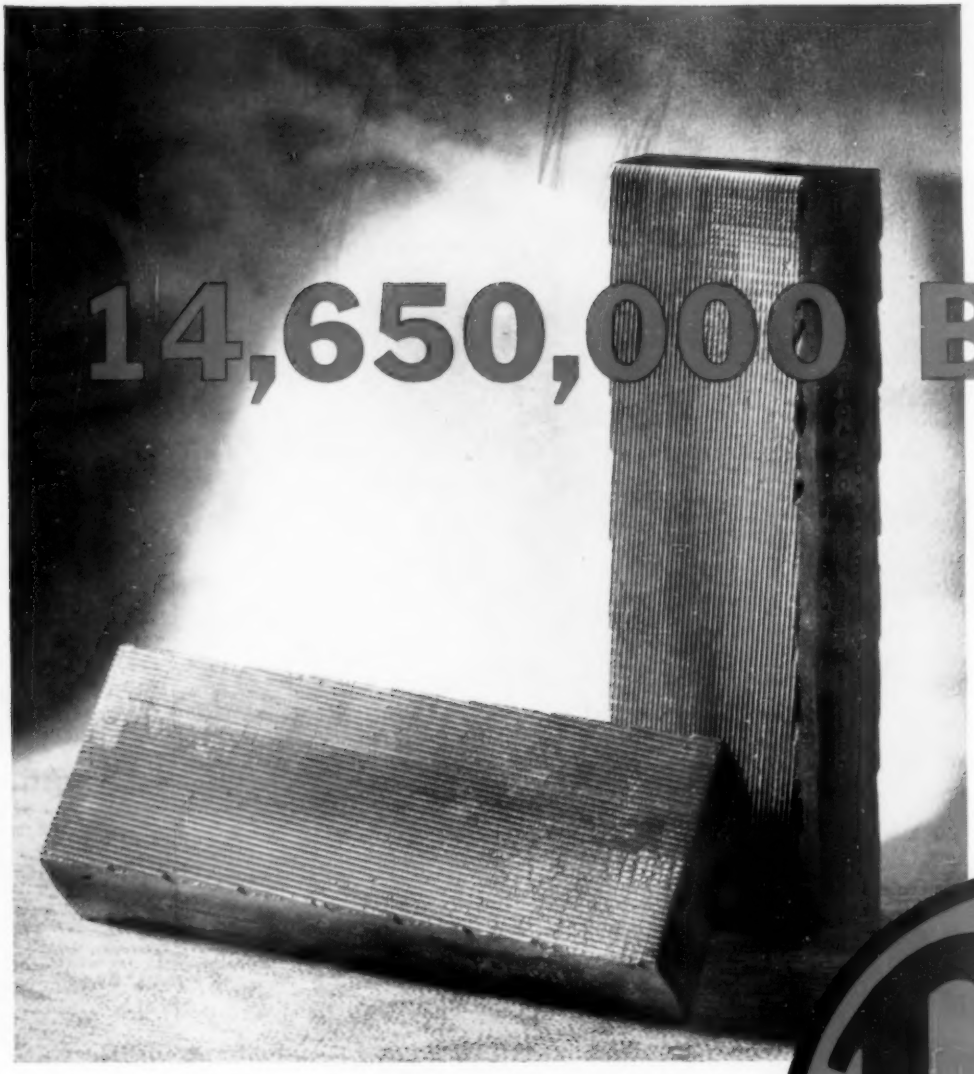

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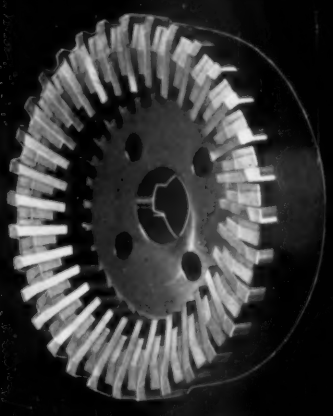

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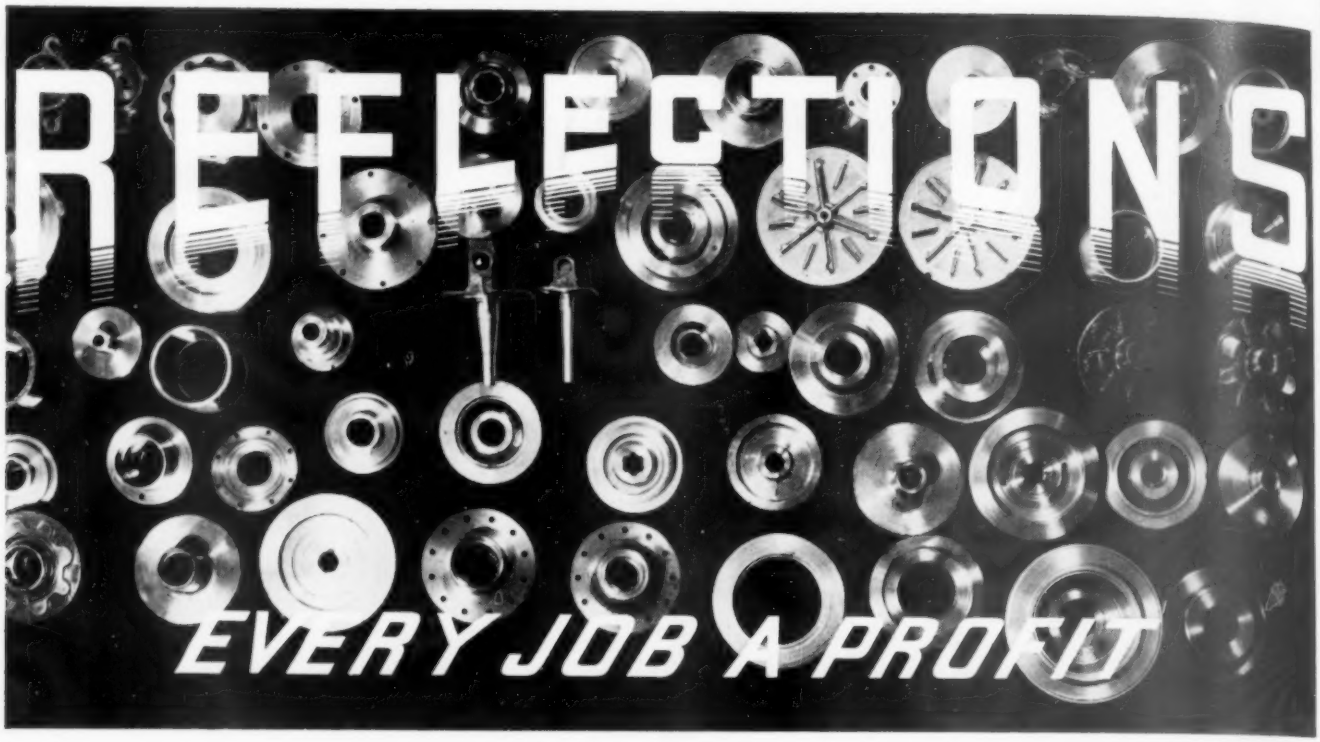

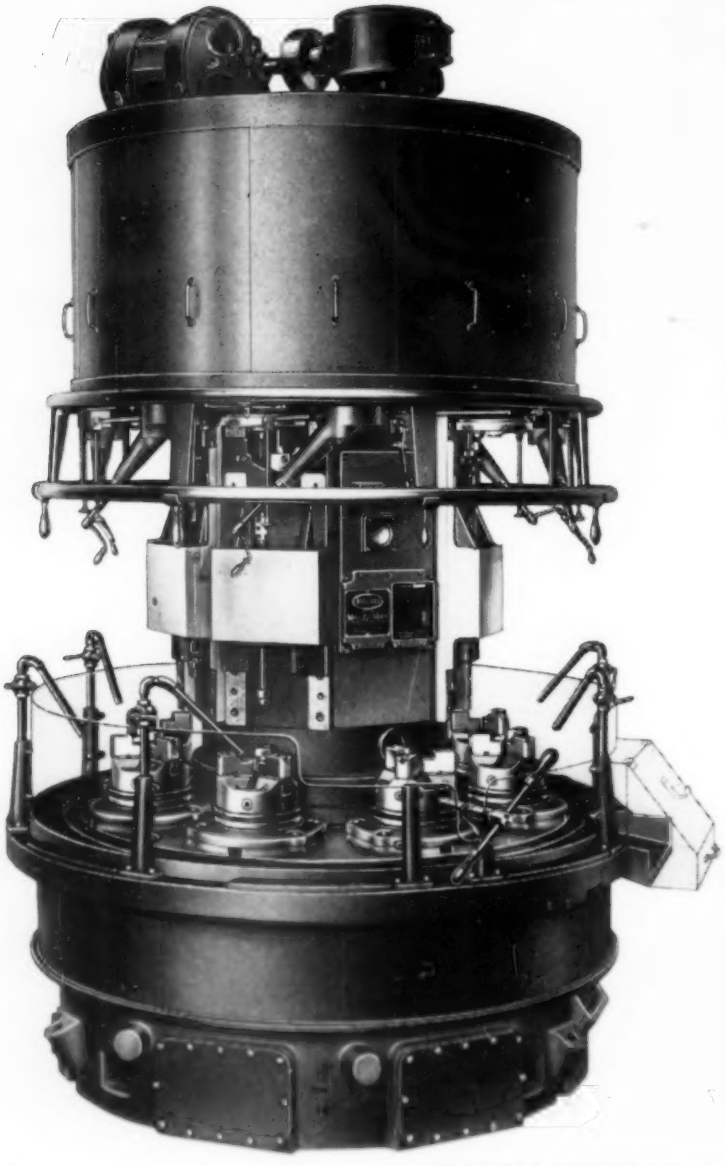

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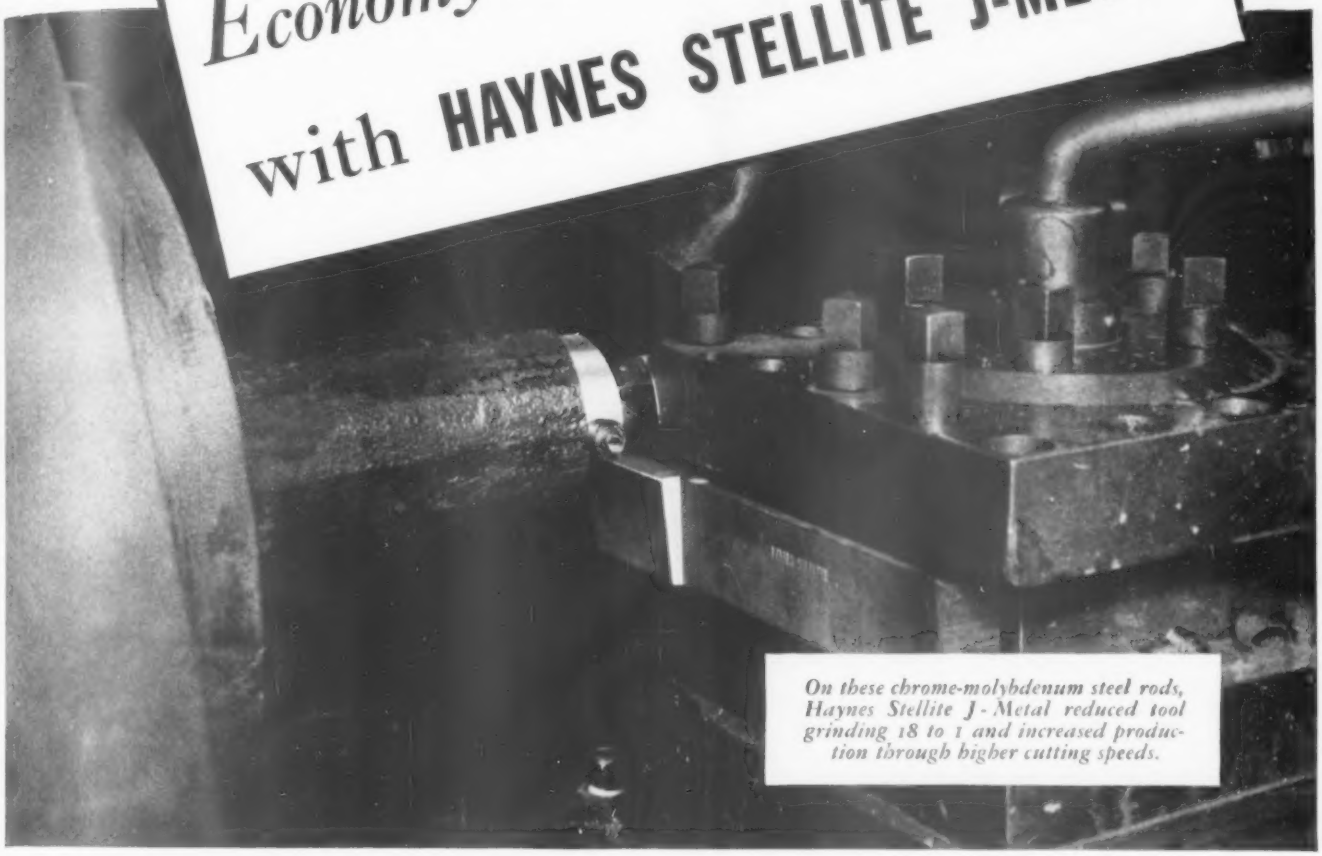

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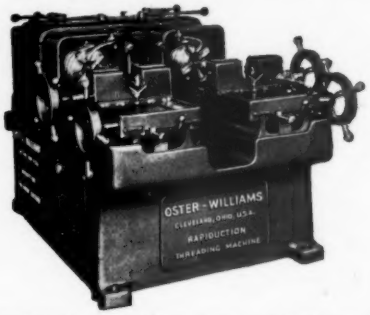

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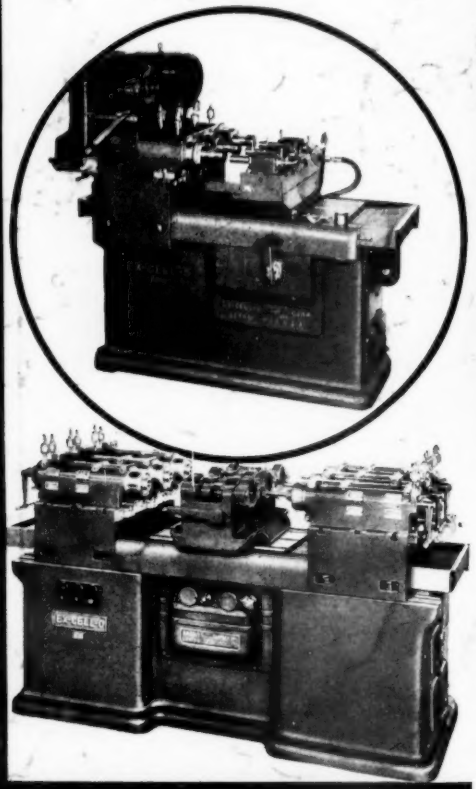

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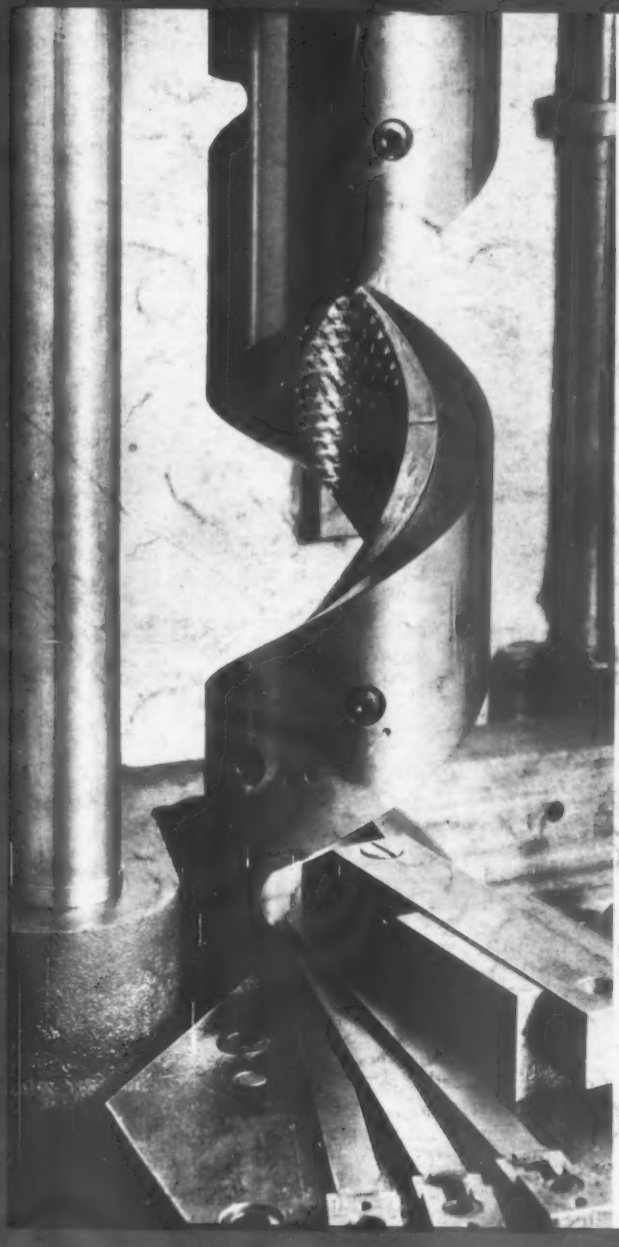

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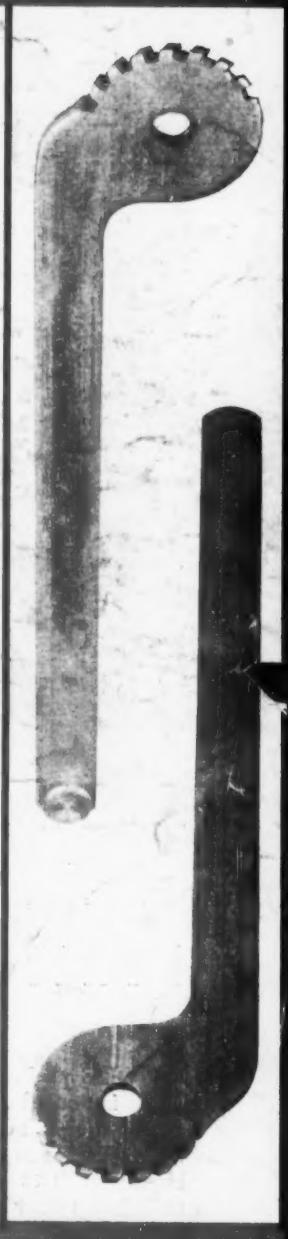

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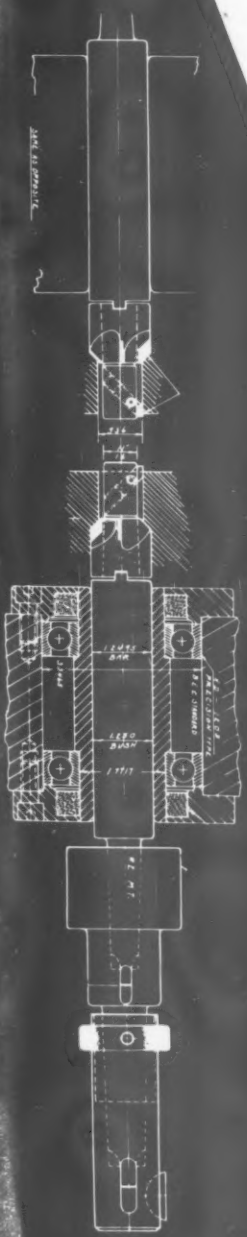

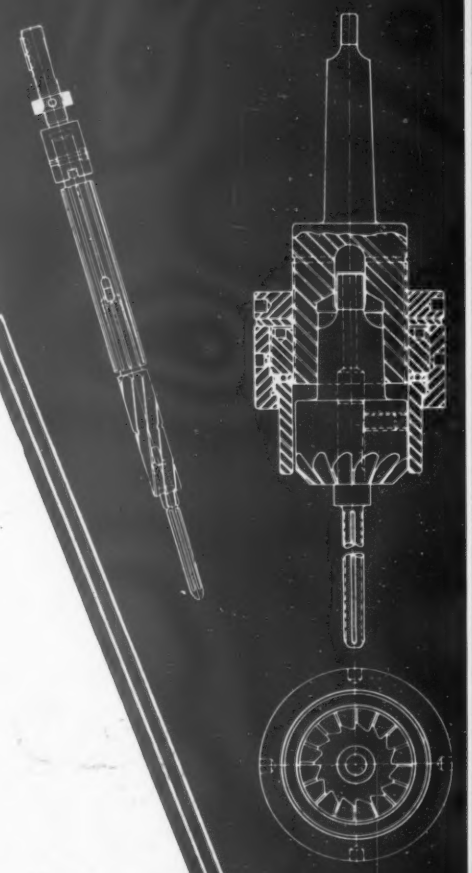

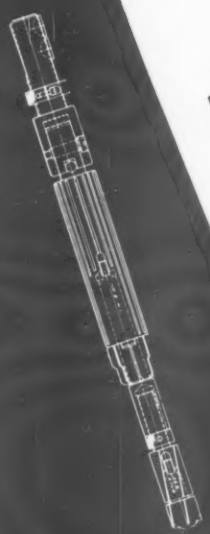

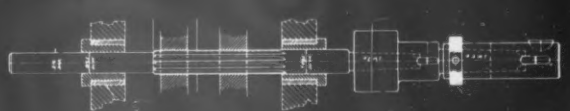

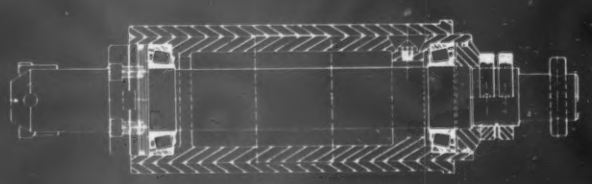

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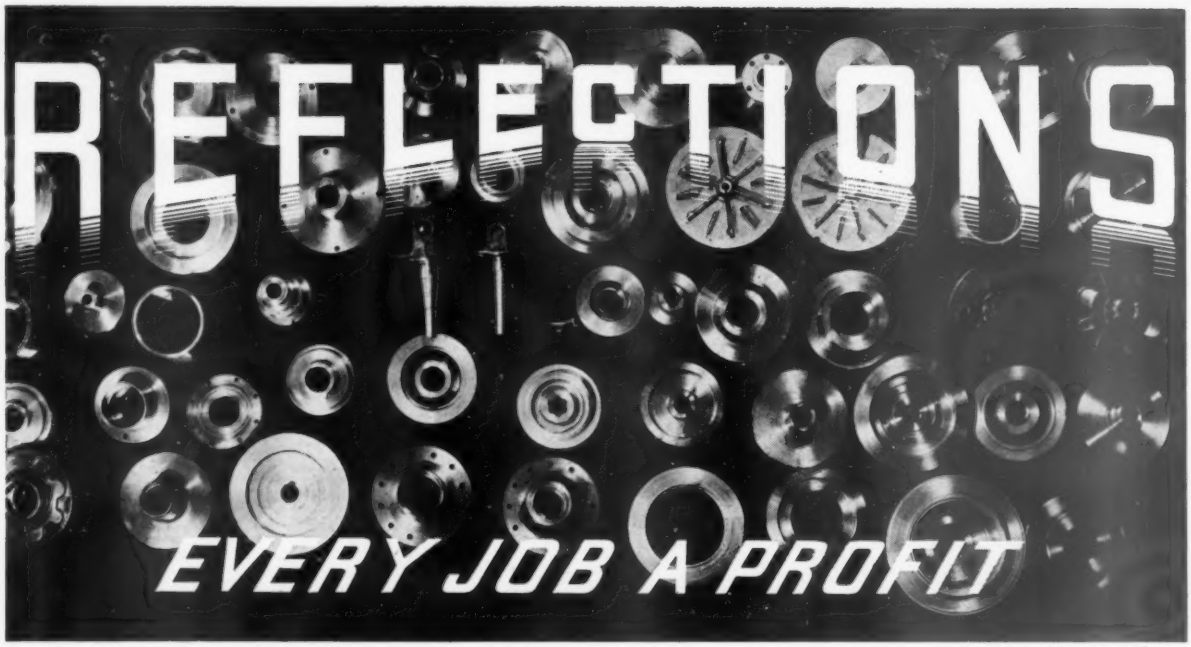

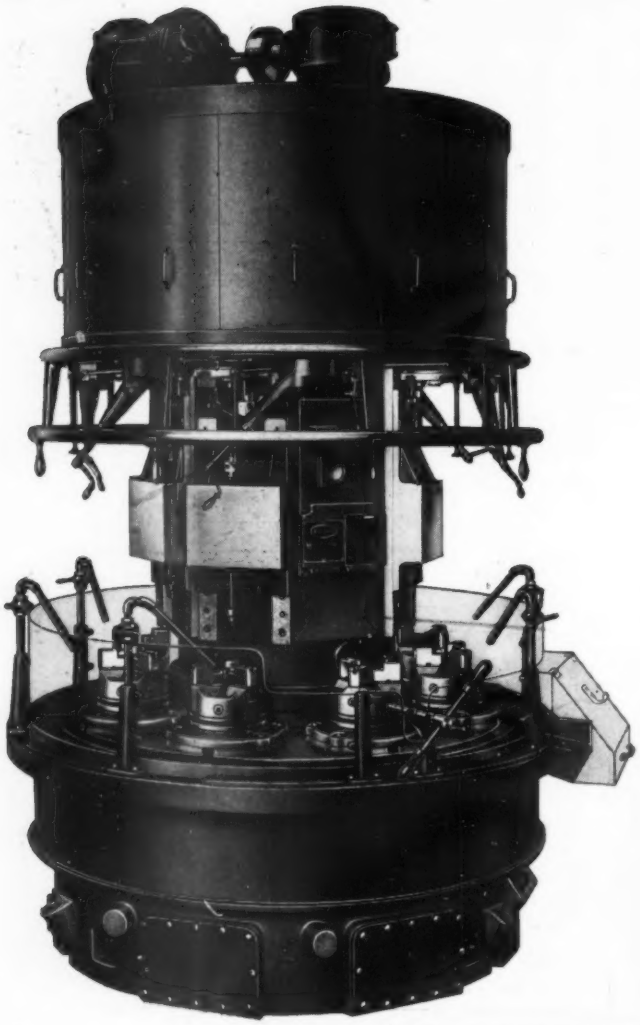

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Flexibility of machines and tooling makes for Practical and Profitable Performance with "Every Job a Profit."

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ENGINEERS • DESIGNERS • MANUFACTURERS • PNEUMATIC AND HYDRAULIC PRODUCTION TOOL EQUIPMENT

BROACHING

Otto W. Winter*

Technical Editor
for this issue

EDITOR'S PREFACE

Broaching, developed over a period of years from a simple key-seating operation to a major factor in metal processing, has such an interesting history, has so many ramifications and offers so many possibilities that volumes could be written on the subject without more than scratching the surface. In some of the following articles, a few applications will be considered—enough to permit of a fairly comprehensive insight into the subject.

We are especially indebted to Mr. Ira D. Grove, of the American Broach & Machine Co., of Ann Arbor, Mich., for an interesting History of Broaching. Actually, one of the officers of this company Mr. F. J. Lapointe—is a pioneer in the art; this fact, however, the author modestly omitted. Also the article: "Surface Broaching vs. Milling" is a fine example of open mindedness, considering that this company is a division of Sundstrand Machine Tool Company, prominent in milling machine development and manufacture.

We are also grateful to the Oilgear Company, of Milwaukee, for material on special applications, and also to the Colonial Broach Company who also has evidenced such a cooperative spirit. While space limitation has necessitated some editing and abridgement, the salient points of broaching have been well defined.

The art of broaching is rapidly gaining in favor. This is true, particularly as very intricate shapes can be processed at one pass, or very rapid interchange of tools at several passes. Various companies specialize in divers applications; some for internal, some for external and slab broaching. Those A.S.T.E. members who went to Cincinnati, for instance, are acquainted with the practical methods of surface broaching; this too, is an example of one company manufacturing both milling machines and broaches using the latter method in preference to milling, on certain applications. So, it would seem that the later development is not a rival to the milling machine, rather, the two are supplementary. In all, the process of broaching is typical of the progress and evolution existent in mass production.

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* Chairman, Detroit A.S.T.E. Chapter.

PRODUCTION PERSPECTIVES

News of Mass Manufacturing From Everywhere

These have been the days when business could react in peculiar ways — pending the election. However production as viewed from nearly all sections of the country continues at a higher level than it has for sometime. Big businesses continue to "saw wood" (or *metal* to be more exact) and there have been no orders for machine tools or other capital goods being cancelled because of the outcome of the election. Business is good in Detroit. Production here is being pushed on new models to have them ready for show time.

* * * * *

New England

Nearly all New England mass production plants are **working at full or very near full capacity.** From the **Springfield,** Massachusetts district we learn that indications are that the **last quarter** of this year **will attain the highest level for the entire year.** This is attributed to the momentum given to lines that have been stagnant for a long time and the seasonal reverse in industrial activity that is normal in the late fall is not anticipated. **During the past month industry of this district held its own despite the sag in automotive requirements.** The sustained demand for refrigerators saved Westinghouse from any marked seasonal decline and the wide interest shown in air conditioning affords good promise of an early increase of production at this plant.

Machine tool industries of the Springfield district have experienced little of the August and September drop and prospects for this month are very good. **Van Norman Machine Tool Company** of Springfield **is expanding** to take care of production necessitated by the purchase of a plant in San Francisco. At the **Gilbert and Barker Manufacturing plant production** of gasoline pumps **is still at a high level** despite the lateness of the season, and **oil burner production is holding up steadily.** There has been no reduction of employment from the high level of September. **Perkins Machine and Gear Company reports well sustained business** while foundries continue to produce in good volume. **Indian Motorcycle Company** is rushing operations on new models and **employment is being maintained** at about 400 on a 45-hour week. **Considerable equipment is being installed,** mostly in replacement of obsolete or worn parts. Advance orders for the new machines are reported as coming in in good volume. Up **in Keene, New Hampshire, Kingsbury Machine Tool Company has experienced a busy season** with its automatic machines for milling, drilling and reaming, used interchangeably on the same frame. **In Springfield, Vermont, Jones and Lamson Machine Company have had an excellent business on lathes and automatic screw machines** with a good foreign business supplementing their domestic sales. **In Worcester, industrial activity has shown pronounced gains.** In the machine tool lines, both the **Norton Company** and the **Heald Machine Company** have a substantial volume of orders on their books. From Brookfield we hear that 34 employes of the Norton Company, who have been in the company's employ twenty-five years or more, were recently presented with badges and diplomas for their faithful and loyal service to the company. The occasion was an outing at the home of Mr. **George N. Jeppson,** general works manager of the company.

Machine tool production in **Connecticut also continues at a high level** indicating a large replacement and expansion market brought about by steady improvement in mass manufacturing industries. Employment figures and **payrolls** for August **in Meriden, Waterbury, and Wallingford showed increases** during the past month. August figures for Hartford and Bridgeport were given in this column last month; those for September were not available at this writing. **Pratt & Whitney Company** in Hartford **has brought out a new bench lathe** of large size having unusual features such as, anti-friction bearings for head and spindle and transitorque drive with motor mounted on a variable speed control device, etc. Demand for gauges is reported very strong. **Orders for shapers, vertical surface grinders, gear grinders, die-cutting machines** and **fixtures in the Connecticut district are coming in steadily** from both domestic and foreign sources. **Stanley Rule & Level Company,** New Britain, manufacturers of hand tools, **reports its current rate of business as practically on the level of 1929,** with a $200,000 plant modernizing program inaugurated last year still in progress. **New Britain Machine Company,** New Britain, **has had a very busy year** on automatic screw machines and chucking machines, with no indications of a let-up. Their **plant is operating night and day** and its output for 1936 is **conservatively estimated at 50% more than last year. William L. Gilbert Clock Company,** Winsted, is **operating 19 hours a day,** with 400 men on two shifts.

Ohio

From Cleveland we hear the **Fisher Body plant,** Cleveland's largest single employer, **will build a $1,000,000 addition** to its plant at Coit Road and East 140th Street this winter. The building will cost in the neighborhood of **$500,000 and an equal amount will be spent for new equipment. It is understood that the die shop to be placed in the new addition will be moved to Cleveland from Detroit.** At present 8500 men are employed in the Cleveland Fisher factory on Coit Road and when the new addition is opened this figure **will be increased by 200 to 500 men.** Chevrolet bodies are made in this plant. **The Weatherhead Company,** manufacturer of auto parts, **have announced the purchase of the former Hupmobile Motor Corporation plant. Murray Ohio Manufacturing Company** in Cleveland **plans the revamping of its plant** to provide additional floor space **for the manufacture of bicycles. General Electric Company** plants **in Cleveland, Niles, and Warren, Ohio,** received official notice that the 6,000 employes of these plants will share in the 2% wage increase recently announced by the general man-

(Continued on page 28.)

HISTORY of BROACHING

By
Ira D. Grove
American Broach Company

THE early art of internal broaching had its origin in the state of Connecticut and this development along with designing and manufacturing of broaches and broaching machines was held in the control of a single family for a number of years.

Through these people, broaching was pioneered over thirty-four years ago and their Yankee spirit coupled with foresight and tireless effort is largely responsible for the success of broaching machines today.

Surface broaching is looked upon today as a comparatively new art as this method of finishing surfaces has become popular within the past few years in the general industrial field.

I had an occasion about eight years ago to visit several large manufacturing plants in the East in making a survey of the possibility of a market if such a machine were developed.

I found at that time in one large electric equipment manufacturing plant some home made surface broaching machines which were doing a very remarkable job on broaching their parts. These had curved and irregular surfaces which made them practically impossible for a milling operation. This operation was highly successful and I found that this machine had been giving proof of its utility for over twenty years in daily production. These people made their own broaches in their tool room, and they were obtaining a very long life from their tools.

At another plant I found a surface broaching machine which was made by an inventor in their plant. This machine was a failure for several years because they were unable to clear the surface broach teeth from heavy chips which would weld onto the teeth due to too much metal being removed per tooth. They were using a broach which was too short and had insufficient quantity of teeth for removing the metal on this particular job. It was learned here that a surface broaching chip should be light so that it would curl easily and fall out freely.

While on this trip, I found many very interesting surface broaching applications on rack type presses in a large forging shop. These presses were very successful and were in operation many years for finishing their forgings.

The largest installation of surface broaching machines of the home made variety was found in a large plant in Massachusetts where they devoted their efforts to manufacturing gears, racks, cams, and precision parts. In this plant several machines were being used for broaching the teeth in gears of small diameter; to my great surprise I found that they were producing a gear more accurate than had been made on machines of other cutting methods. The finish was better and practically free from any tool marks.

A novel indexing method was being used on the broach holder on one machine. As the broach would perform the roughing cut on the down stroke, the index feature was being operated at the end of the stroke where it would index, throwing around into the cutting position a finishing broach. This broach would finish the gear tooth on the return or up stroke thereby utilizing both the down and up stroke of the machine. Another surface broaching operation, and probably the first one which was used in this plant, was set up on a small horizontal planer. On this machine the work or gears were placed in the fixture which was located on the tool slide rail. Several of these fixtures were used and each fixture was automatic in its indexing arrangement.

The several broaches were fixed on the planer table, one for each gear to be cut. At each stroke of the planer table, a gear tooth was produced in each gear; as an illustration, a gear with ten teeth would require ten strokes of the planer, but with several fixtures in cut a very high production was obtained.

I found in all these early developments that the concerns mentioned were compelled to make their own broaches, as success or failure depended largely upon the ability to make a surface broach that would clear the chips. No time could be allowed for brushing off chips if a reasonable production was to be expected.

Much was learned from these engineers and mechanics where this pioneering work was done. Now the time was ripe for real production of surface broaching machines so that the general field could enjoy the advantages of this development. This seemed to travel rapidly into the Middle West where at this time several concerns are manufacturing this type of machine in large quantities.

Early Developments and Present Day Possibilities in Broaching

By

Harry H. Gotberg

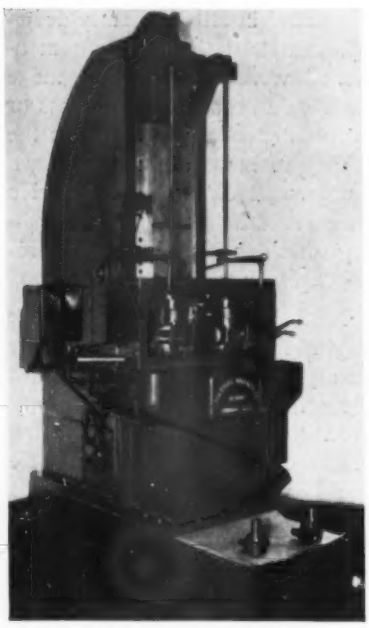
Colonial Broach Co.
Member A.S.T.E.

Internal Broaching

BROACHING dates back to the day when it became necessary to produce holes that were not round. Confined to a few variations at the outset, broaching tools today — for intenral broaching—run the entire gamut from simple splines, through square holes, oval holes, hexagon shapes, serrated and rectangular holes to intricate cam shaped contours, ratchet teeth, etc.

When first developed, the broaches were of rather crude design. Since the only grinding done after hardening was on the outside diameter and in the sharpening of the cutting face, the broaches were generally made of a tool steel that could be hardened with the least amount of distortion.

While satisfactory in the days when selective fits and 'hand' production was the order, these earlier types of broaches are out of question today when mass production requires interchangeability and highest accuracy in manufacture.



Splined broaches are used to finish round holes from the rough in two strokes at 30 degrees index with this Colonial set-up.

It was the necessity of holding splined holes to the highest degree of accuracy that led to the development of the modern type of broach, pioneered in the form of high speed steel by the Colonial Broach Company. This resulted in doubling and tripling of broaching production, increasing broaching speeds from an average of around 5 feet per minute to 30 feet per minute. Even greater speeds than this have been realized without injury to the broaching tools.

While the demand for finishing irregular internal contours underlay this development, the broaching of plain round holes was also improved by this method, so that today broached holes are considered superior for finish to those produced by any other method with the possible exception of grinding and diamond boring in some cases.

Probably no cutting tool industry and probably no manufacturing industry has developed quite as rapidly as the broaching business. A highly specialized industry, it calls for skilled workers, specially trained in the art of broach manufacture. It requires special equipment, which for the most part had to be designed and developed by the broach manufacturers themselves as need for them arose.

With all of these advancements and improvements, however, it is conceded, at least by broach manufacturers, that the broaching industry is still in the developmental stage. With each new development in commercial commodities, such as automobiles, tractors, refrigerators, oil burners, machine tools, etc., new broaching applications are discovered. The broaching industry, therefore, is constantly on the alert to develop and introduce any broaching methods that will meet the requirements of these new demands — involving an even higher degree of accuracy and an even higher output.

The automotive industry seems to lead the field in the requirements of broaching tools and equipment, due mostly to the high production requirements and the necessity of reducing labor costs to meet competitive prices. There is no doubt but that improved broaching facilities have helped to reduce and maintain the moderate production cost and selling price of automobiles today.

Typical of the developments in broaching were those which were brought about as a result of the development of the Syncro-Mesh transmission with its spiral gearing and internal spiral splines. This required the development of hardened and ground high speed steel broaches which offered no increase in difficulty in production of spiral splines over straight splines, whether the tooth form be straight sided or involute in character. Within reasonable limits spiral broaches that "drove" themselves through the part without the aid of any special driving equipment could, of course, be used where angles and leads were within reasonable limits. This new type of broach, however, proved much more successful when spiral driving attachments were developed for the broaching machines. This was particularly true in high productions runs.

Surface Broaching

Although much more could be said about internal hole broaching, the most rapid advancement in broach engineering and broach development recently has taken place in the field of surface broaching — the broaching of external surfaces. This development has contributed very largely to maintenance of large scale commercial production requirements while lowering production costs and increasing accuracy of finish.

In its development surface broaching, of course, has largely competed against milling. It

would be unfair, however, to make comparative statements between broaching and milling as there is a definite field of operations that probably always will be better adapted to milling and milling equipment. Nevertheless manufacturers of machined parts have become more broach minded than ever before in connection with the finishing of external surfaces.

The facility with which any production method can be used frequently depends on how well those parts are adapted to that process as a result of engineering design. The time is rapidly approaching when engineers and designers of commercial commodities generally will take broaching into consideration in the design of the product itself.

Boaching appeals particularly in the automotive field in this respect, since yearly model changes provide no guarantee of more than a year's run—requiring a return on the investment within the period of a year. Although the initial investment on broaching equipment may be slightly higher than for other equipment equivalent to perform identical operations the greater production realized more than justifies the expenditure and makes the investment a better one. With the development of standardized broaching machinery such as was introduced a few months ago by Colonial Broach Company—machinery which can be rapidly converted for different operations with a minimum of salvage loss—a further protection of investment has been provided.

Broach Design Factors

As to the design of broaches, this is governed primarily by the nature of each application. It is true, of course, that the fundamentals of broach design with relation to tooth form, back off angles, chip distribution, etc., are fairly well established, but the tremendous variations in the design of individual broaches make it necessary, for most effective results, to rely on the experience and research in the broaching field gathered by broach producers.

In general the design of broaching tools for each application can be based primarily on the following 10 principles, some of which are predetermined and some of which should be selected by the broach manufacturer:

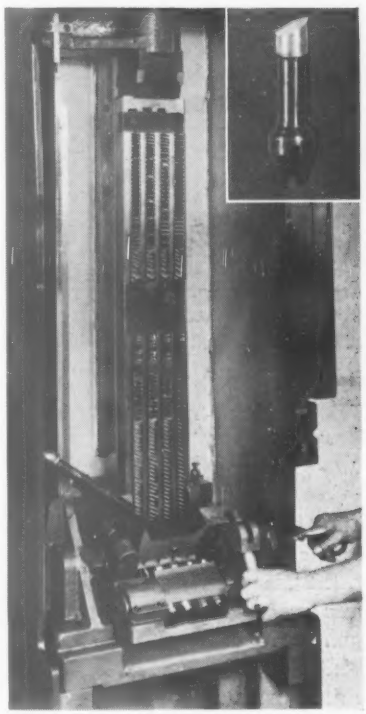
1. Material to be broached.
2. Length of material to be broached.
3. Amount of stock to be removed.
4. Limits to which broached hole or surface must be held.
5. Hardness of material to be broached.
6. Heat treatment of parts to be broached.
7. Diameter of hole, or width of surface.
8. Type of broach required (push or pull).
9. Machine on which broach is to be used.
10. Power of machine to be used.

Step per tooth and cutting rake are governed for the most part by the material to be broached. In general cast iron, brass and aluminum will permit a greater step per tooth than steel. Likewise the cutting rake varies with cutting specification. Pitch or distance between two teeth is governed primarily by the length of the part, a short part requiring less space than a part of greater length to allow for chip clearance. Pitch, however, varies also in relation to diameter of broach and material. In any case the broach designer must be governed by the most practical method for chip removal and chip clearance.

Overall length of broaching tools depends on diameter of hole, stock to be removed, length of part, material specifications, hardness, stroke and capacity of machine, etc. If the stroke required exceeds the normal capacity and power of the machine a set of two or more broaches must be used. The same is true if a broach of small diameter would exceed a length that is practical considering the possibility of breakage.

Broaching of parts after heat treating is usually referred to as "Hard Gear" broaching in that it is applied mostly to transmission gears or gears subject to hard service or excessive wear. Broaches for this purpose are made from a special grade of high speed steel and are given a special heat treatment to procure the greatest life or largest number of broached parts per tool. Tool life, of course, can not be as long as in broaching parts that are not heat treated, other conditions being equal.

Broaching tool and broaching machinery manufacturers have built the industry to its present state of development by close cooperation with manufacturers of machined parts. They are always ready and invite such manufacturers to bring their manufacturing problems to them wherever they involve the finishing of internal contours or external surfaces.



Broaching four brake levers at one time on a Colonial Broaching Machine. Two radii have to be broached on each part. The lower sets of broaches rough and finish respectively one radius. The fixture then indexes automatically and the other radius is rough and finish broached during the remainder of the stroke by the upper sets of broaches.

Broaching Applications

By M. E. ENGEBRETSON
Oilgear Company

Rough and Finish Broaching Sides and Bottoms of Main Bearing Cap Surfaces on Eight Cylinder Motor Blocks

Figure 1, below, illustrates a large horizontal broaching machine for rough and finish broaching sides and bottoms of main bearing cap surfaces that meet with the web of the crank case in 8-cylinder motor blocks. A finished motor block is shown in the foreground.

Cylinder blocks are carried to and from the working position in the center of the machine by a conveyor along the full length of the machine. Operator moves the cylinder block from main conveyor onto the short conveyor in the machine and trips a small lever which automatically locates and raises the cylinder block through hydraulic cylinders and togles to the broaching position. Another small lever securely clamps the block in place. Then the operator trips the main control lever which actuates the control on the pump and permits the power fluid to move the large slide on top of machine with inverted tools to sweep across the block and finish the sides and the bottoms of the main bearing cap surfaces in one pass at the rate of 60 blocks per hour. Before the main broach slide returns, the motor block is lowered hydraulically and removed from the machine. All controls are so interlocked that if the cylinder block is not located properly, or removed after being broached, it is impossible for the operator to shift the main control lever, so as to actuate the main broach slide.

The broaching machine frame, which is 28″ wide x 67″ high and 26′ in length is made of heavy allsteel welded construction with provision inside for mounting the Oilgear type DH-3511 two-way variable delivery pump. The tool which is of the insert type and takes a generating cut is mounted underneath the long slide which moves on large hardened steel ways. The cylinder is of the differential type with the cylinder fixed to the frame and *both ends of* the ram attached to the long telescoping slide, while the cylinder becomes a part of the slide. With this arrangement the chips fall away from the tool into compartments provided in the base of the machine and also insures the main slide to be kept free from chips.

This machine has a normal pulling capacity of 40,000 pounds, a stroke of 130″, a broaching speed of 24′ per minute and a return speed of 60′ per minute. The net weight of the machine is 32,100 pounds. The pump is driven by a 25 HP, 900 RPM electric motor and is of the variable delivery type which enables the operator to inch the movement of the broach slide or to adjust the broaching and return speed to best suit the operation performed. When used at maximum speed and capacity, this machine is capable of producing 70 blocks per hour.

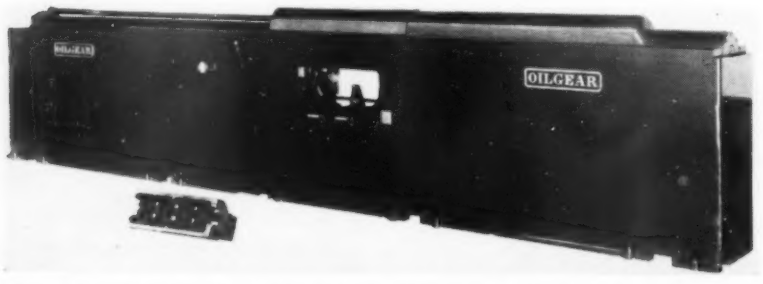


Figure 1.—Large horizontal broaching machine for rough and finish broaching sides and bottoms of main bearing cap surfaces—with finished cylinder block shown in foreground.

Another Application

Figure 2 shows tools and slide used on horizontal surface broaching machine, similar to that shown for broaching the main lock seats and rough

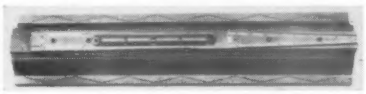


Figure 2.—Showing tools and slide used in a horizontal surface broaching machine.

rank bore in six and eight cylinder motor blocks. The tools are made of high speed steel, and are of the generated type with built up sectional designs. On cast iron parts, where the outer scale must be removed as part of the machining operation, it is difficult to get the roughing sections to stand up if each tooth is required to take the full width of cut. The actual breaking through this scale is the most severe part of the cut and is responsible for the short life of the broach. The tool mounted on the right hand end of the slide shows an effective method for overcoming this difficulty. It is of the insert type and takes a generating or progressive cut. This tool section rough finishes the main lock seat, while the small tool sections on the left hand end of the slide finishes the main lock seat. On the right hand end of the tool slide are two rows of broach inserts arranged in the form of a "V" with the small end starting the cut at the roughing depth, parting the scale in a transverse direction and progressively until the full widths of the main lock seats are rough finished. This design of broach requires a minimum amount of power to operate and at the same time lengthens the life of the broach. In the center of the slide is a two section circular broach used for broaching the rough crank bore. Since, a semi-cylindrical shape is being broached, the tool can be reset 180 degrees after one-half has become dull, which permits the full 360 degrees of cutting edge to be used. The sides of the main lock

seats are rough and finish broached by the tool inserts mounted on the side of the tool carrier.

This surface broaching machine was arranged for 120″ stroke, 50,000 lbs. normal broaching capacity and equipped with an Oilgear Type DH3511 pump. This machine weighs 27,300 pounds and has a normal production of 70 blocks per hour.

300 Finish Broached Dynamo Yokes Per Hour on an Oilgear "Cyclematic" Machine

Figure 2 shows two dynamo yokes of hot rolled flat steel strip welded together are finish broached per cycle at the rate of 300 parts per hour on this Oilgear type "XM-80" Cyclematic Broaching Machine, the largest machine of its kind, designed and manufactured by the Oilgear Company.

The specifications illustrate the size of this machine. Over all height 187″, width 68″, front to back 92″, normal broaching capacity 80,000, peak broaching capacity 120,000 pounds, maximum stroke 54″, cutting speed variable from 5 to 30 per minute, weight 30,000 pounds. This machine was equipped with an Oilgear Type DR-6011 Variable Delivery Pump and Oilgear Type C-2011 Constant Displacement Pump, both of which are driven through a Texrope drive from a 75 HP electric motor. The pump, electric motor, piping, valves and control mechanism are all mounted inside of the frame which is of all-steel welded construction.

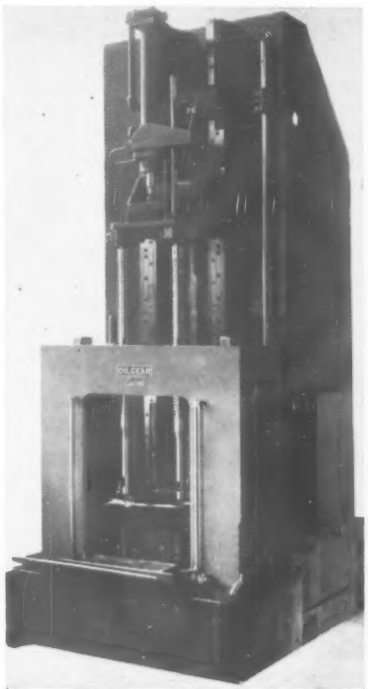


Figure 3.—Cyclematic broaching machine, the largest of its kind, for broaching two dynamo yokes of hot rolled steel, welded together.

Figure 3 shows the carriage and tools in the loading position with the yokes in place ready for the automatic broaching cycle; the first cycle of operation automatically threading the tools through the work, then being ready for the actual broaching operation. The tool handling crosshead is shown in the lowered position, the tools threaded into the work and the carriage ready to raise the work over the tools. At the upper end of the carriage stroke the work is mechanically ejected onto a false table. As the carriage is lowered to loading position the false table is tilted and work automatically unloaded. All the operator has to do is load the two parts on the carriage table and then trip the foot pedal. The entire broaching operation, the handling of tools and ejection of work is all accomplished automatically.

The large yokes are 3⅞″ diameter inside, have a 11/32″ thick wall and vary in length from 6 to 7 1/16 inches. Fifty-two teeth on a broaching tool 58″ long remove approximately .035″ stock from each yoke. The largest of these tools weighs 260 pounds. The lower end of the tool is equipped with a slot through which a key is automatically inserted to hold the tools in position on the lower end during the broaching operation. The broaching teeth of each tool are built into sections so that the roughing section can be discarded when worn and the other sections moved forward. Other dynamo yokes also broached on this machine vary in diameter from 3″ to 3⅞″ in size.

Some of the features of Oilgear Cyclematic Broaching illustrated are; work is loaded at a convenient level,—large, heavy tools are handled quickly, smoothly and automatically,—work is centralized and threaded over tools automatically,—simple foot treadle starts semi-automatic cycle,—work is ejected mechanically.

Handy Andy's . . Workshop . .

"Say, I like your crowd, and I'm glad I came," was the comment of a guest, at the October meeting. "What particularly impressed me was the high intelligence of the men I have met." Well, yes, we're a pretty good bunch at that, and, according to all the dope, engineers rank quite high in intelligence. But thanks, Mister—and come again. Better yet, become one of us.

♦ ♦ ♦

I told you there were some real guys in those new chapters, once we got to know them. And I guess they feel the same way about us Detroiters, the way things turned out. The high vote accorded directors in out-of-town chapters can only result in mutual confidence—*a feeling that we want them with us.* But then, we really do.

♦ ♦ ♦

We missed out on a nationally prominent speaker the evening of the 8th, but, no speaker could have given us greater pleasure than Mr. Fintz of Cleveland. Say, *that* guy has the goods, and speaking for myself I want to see more of him. I like him. That goes for his buddy, too—Mr. Hawkey. Now don't forget what I told you, boys.

♦ ♦ ♦

Of a different type, but impressing us as a man who will go out and do things, was Mr. Hiatt of Racine. Somehow, our guests from **N**orth **E**ast **W**est **S**outh gave us an impression of permanence—it was a tough beginning but a worth while effort. We will grow together.

Heard it announced that a chapter is coming through in Chicago. That is Bert Carpenter's bailiwick now, isn't it? Well, there's another fine chap, and the Chicagoans will do well to consider him for the chairmanship. He did excellently in Detroit. Greetings, Bert—and good luck.

(Continued on page 37.)

Surface Broaching vs. Milling

By
Ira D. Grove
American Broach Company

Many competent Tool Engineers have voiced the opinion that milling of duplicate parts on a high production basis is on the way out. This opinion is usually the result of the completion of a very successful job development and the installation of a surface broaching machine for broaching the surfaces of a particular part.

Surface broaching has many outstanding advantages over milling, but only where the work is well suited for the former. The milling machine has advantages, too, where surface broaching should never be applied.

Broaching machine construction is such that the work and tooling is well supported at all points. Each is backed up in a solid manner and tied together in a fashion so that vibration and chatter cannot enter into the cut. The long broach slide—with a generous surface area of support—backs up the broach throughout its entire length, and the work table should be bolted to the column which supports the slide, making a solid mass construction.

Compare this machining method with a milling machine, having a milling cutter held on a rotating arbor, which is supported in bearings away from the cut and usually driven through a train of gears, each gear with a small amount of back lash. This accumulation of loose back movement makes a rather poor support to a cutting tool.

The feed screw which engages the table nut has the tendency of wearing rapidly on account of its limited area of contact, soon producing an unsubstantial backing of work to the cutter.

Much, however, has been done in milling machine development in the past few years, by building in more cutter support. This was accomplished by adding extra arms with bearings up to the cutter as close as possible and eliminating gears not needed in order to get more support to the cutter. The new climb cut type of milling machine feed promises to be a great improvement and tends to lend greater support of the work to the milling cutter. Climb cutting permits better finishes to the work with the accompanying advantages of much longer tool life over other milling methods. These improvements have meant much in the progress of holding the milling machine in its proper place in competition with surface broaching machines.

The milling machine is an indispensable machine tool and will always have its place in plant equipment. As a matter of fact, in my many years of development work in surface broaching, I believe I can safely say that to every job which was accepted for surface broaching, an equal amount has been rejected as unsuitable; these jobs were returned back to the newer type of milling machines.

Many parts to be machined are light in construction and lend themselves much better to a milling machine with a slow feed and a high cutter speed, whereas a broach would probably crush the piece. Likewise, parts with deep slots can only be milled to an advantage because the average broaching machine has insufficient length of stroke. It has also been found more profitable to mill work which is subject to having hard chill spots in the metal because, when a milling cutter strikes a hard spot at slow feed, a cutter is usually dulled. This tool can be easily resharpened at low expense, but a broach, which cannot be easily stopped in the cut, is sometimes ruined as a result. In such cases the tool loss is high in comparison as a broach is much more expensive than a milling cutter.

Work having a shoulder at right angles to the cut such as a keyway cannot be broached on account of tool interference with the shoulder, but a milling cutter with small diameter can approach a shoulder very closely.

Where experience dictates the selection of suitable work for surface broaching, this method of machining is many times faster than milling. Much better finishes are obtained by surface broaching; also, a much higher degree of accuracy is obtained at a surprisingly lower tool cost per piece finished.

In a milling cutter each tooth is a rougher and at the same time a finisher. If the cutter is slightly out of true, the high tooth does most of the work and soon becomes dull producing a poor finish. As a comparison, a broach is a combination tool in which the first cutting teeth which contact the work are strictly roughers and remove the major portion of the metal. From these roughers, the cut is very evenly graduated up to the finishers and these finishing teeth are reserved for their fine scraping duty only, sizing the work very accurately and at the same time producing a fine finish. The work has an opportunity to cool from the roughing to the finishing teeth as they passover the work thereby removing any error due to temperature change in the work.

The surface broach has the cutting quality of a roughing and finishing tool both built into one cutting unit. The reason for its long life is because of its positive cutting action as each tooth has a predetermined amount of metal to remove from the work. Each tooth takes its small bite never slipping or skating over the work which would tend to dull the teeth; and furthermore, broach cutting speeds are never more than about one-quarter that of a milling cutter.

Milling and surface broaching each have their important place in the industrial field and care should be used in selecting the proper machine tool for the particular work to be done.

Cast Iron or Fabricated Steel -- WHICH?

By
A. E. Rylander
member
A. S. T. E.

THE comparative values of cast iron and fabricated steel in machine tool construction has been a mooted topic ever since welding became a factor in industry. Then, at the October meeting of the Detroit Chapter, A.S.T.E., a casual reference resulted in an over-the-water debate that enlivened the discussion at least one of the tables. Then, "Why don't you write an article about it?" "I'll write one side of the argument," I said. And here it is.

Speaking for myself, I lean toward cast iron construction in machine design, for various reasons. (1) From a sales standpoint, one can design a *grace* into a machine with cast iron bed, columns, guards and tables that is not possible with steel construction unless stamped out. (2) From a production standpoint, cast iron has a *solidness* to it, a freedom from "sing" and vibration that too often is annoying and nerve racking in steel, especially where thin plate is used. (3) One can rib cast iron so that excessive weight is not a factor; besides, with new nickel cast iron alloys one can insure adequate strength and rigidity.

In machining, cast iron has many advantages over steel, especially in the machining of ways and slides, also, bearing surfaces can be scraped to near perfection, as large precision surface plates are scraped. Since machine scraping has largely superceded hand methods, costs of this extra finish are not an important factor.

Another consideration is; with initial engineering done — and with patterns made, preliminary work is dispensed with on future orders. One has only to order castings, barring possible alterations which are easily effected in wood. Incidentally, progressive designers will consider future possibilities, and may use the patterns as a basis for other jobs. This is more prevalent than one would think. Then, too, the same patterns can be used year after year, with modifications to keep pace with the trend in exterior design—with *streamlining*, as some term it. Although I'll be jiggered if I can see any object in streamlining a stationary object except as an appeal to the aesthetic.

I recall a machine I designed almost twenty years ago, and which I meet every so often in the pages of trade journals. I thought it was a real good job at the time—and so did the customer, since he ordered six more—but through the years the original has been "remolded nearer to the heart's desire" despite that the original pattern remains the foundation of the job. I recall another job that was produced in direct competition with a welded product. The cast job was symmetrical and gracefully molded, with levers as graceful as a maiden's arm, while the welded construction not only looked hideous but failed in practice. Of course, the comparison is unfair in a way, since welding was then in an embryonic stage, and has progressed tremendously since then. More so, perhaps, than has pattern and foundry practice.

Given a job which must be produced quickly, with limited time for design and preliminaries, or, assuming a job where extreme accuracy is not essential, I can concede advantages to steel. Yet, I have seen welded steel machinery rip apart in the seams, or the construction warp and buckle so as to tangle the works into a hopeless mess. Of course, all materials are subject to fatigue, and cast iron will fracture although the stresses can usually be anticipated and provided for.

In my opinion, the question is not so much one of material as it is of design. A utilitarian designer can make a cast job just as hideous as the welded construction often is, whereas the engineer who combines artistry with practice can work wonders with steel. I have seen welded steel presses, for instance, that were gracefully designed (comparatively, that is) although on the whole they followed conventional practice in the rest of the job. And apropos of presses, I wonder why the makers stick to straight spur gears when helical or herringbone gears would be so much better, insuring both longer life and smoother action. Press manufacturers lag the machine tool builders in this respect. Snap out of it!

Everything considered, one connot apply a hard and fast rule, since there are cases where it would be impractical if not altogether impossible to produce a machine of cast construction. In such a case fabricated steel is essential. But on the whole, the cast job has an advantage in sales appeal, due to pleasing appearance and rounded contours and profiles, and, on a standardized product can be refined to meet changing demands of design. One has but to look at displays of modern machine tools to be sold on the *visible* sturdiness of modern products. They look husky, yet are rounded and graceful as a household appliance. If producers of welded steel machinery are to compete from a standpoint of artistry they will have to tax their ingenuity. Well, here it is, wide open to your attack.

Here we have another of those debatable subjects, and this time we feel that the reverberations of the discussion will roll on and on. As usual, Mr. Rylander takes one side of the question, frankly inviting critical comment. What is your opinion, pro and con?—Editor.

November Chapter Meetings

Chapter Meeting Announcements must be received on or before the 20th of preceding month. Omissions are the result of not receiving this information by this date—in time for publication.

CLEVELAND

November 17th, 1936.

Dinner: 6:30 P. M.

$1.00 per plate

Technical Session at 8:00 P. M.

Nela Park, General Electric Company, Noble Road Entrance

Dinner and Technical Session will be held in the Dining Room in the Sales Promotion Bldg.

Speaker: Mr. W. H. OLDACRE, Vice President and General Mgr. D. A. Stuart & Company, Chicago, Ill.

Subject: "Cutting oil and lubricants as applied to Modern Production Methods."

We are very fortunate in securing Mr. Oldacre, who has been connected with D. A. Stuart & Company for the past sixteen years and is a member of the Society of Automotive Engineers, American Society of Metals, American Society for Testing Materials, American Chemical Society, National Association of Lubricating Grease Manufacturers and the Association of Iron and Steel Engineers.

Prior to his connection with D. A. Stuart & Co. he was with the Timken Roller Bearing Company of Canton, Ohio and the General Electric Company at Erie, Pa. in safety and personnel work. He graduated from Hiram College in 1914 with an A.B. degree.

Ladies are welcome to attend these dinners, after which they will be conducted through the Institute Building, by an official hostess.

Kindly make reservations with Mr. G. J. Hawkey, Penton Building, Telephone Main 0112.

FREE PARKING

DETROIT

November 19th, 1936

Dinner: 6:30 P. M.

Technical Session at 8:00 P. M.

Hotel Fort Shelby — Spanish Grill Room

Speaker: Prof. JOHN YOUNGER, Head, Department of Industrial Engineering, Ohio State University.

Subject: "Rambling Thoughts on Jigs and Fixtures."

Professor Younger is so well known to members and friends of the American Society of Tool Engineers that he needs no introduction. His experience reaches back many years to an apprenticeship which he served as a boy in Scotland to important manufacturing executive positions in major industries of this country. Sometime ago he was elected to honorary membership in A.S.T.E. and we are very fortunate in having him with us on this occasion. An unusually large attendance is anticipated—so, make your reservations early.

MILWAUKEE

November 12th, 1936.

Republican House — Colonial Room

Short Business Meeting — 8:00 P. M.

"Around the Black Board Discussion" — 8:15 P. M.

Technical Session — 8:40 P. M.

Speaker: CHARLES J. MARTIN, Ex-Cell-O Aircraft & Tool Corporation.

Subject: "Fundamentals of Jig and Fixture Design."

Following the technical session a short entertainment program will be given and a buffet luncheon served. Tickets 75c upon admission to the meeting.

RACINE

November 9th, 1936.

Hotel Racine

Technical Session 8:00 P. M.

Speaker: A. F. ANJESKEY, General Manager, Cleveland Electric Tramrail Co., Subsidiary of Cleveland Crane & Engineering Co., of Wickliffe, Ohio.

Subject: "Material Handling" Come early — bring a friend

Readers of *The Tool Engineer* and friends of the American Society of Tool Engineers, whether members or not, are cordially invited to any of the above meetings.

PATENTS

PATENT APPLICATIONS

Amendment

The response to the office action must be complete and received by the Patent Office within six months from the date of the office action. No extension of this time will be allowed.

In order to be entitled to a re-examination or reconsideration of his case, the applicant must make a request therefor in writing, and he must distinctly and specifically point out the supposed errors in the examiner's action. The applicant must fully respond to every ground of objection and rejection, and the applicant's action must appear throughout to be a *bona fide* attempt to advance the case to final action. Mere allegation that the examiner has erred will not be received as a proper reason for such re-examination or re-consideration.

The applicant has a right to amend before or after the first rejection or action, and he may amend as often as the examiner presents new references or reasons for rejection. In so amending, the applicant must clearly point out all the patentable novelty which he thinks the case presents in view of the state of the art disclosed by the references cited or the objections made. He must also show how the amendments avoid such references or objections.

It is important that during the prosecution of a case that the applicant use care in cancelling broad claims from his application which he later may desire to re-insert, since such cancellation may be considered an abandonment of the broad scope of his invention either by the Patent Office or later by the Courts should the patent issue and become involved in litigation.

Petitions to the Commissioners of Patents

Upon petition, the Commissioner of Patents will review any adverse interlocutory objection or requirement that has been twice made by the examiner and which does not involve the merits of the invention.

Seventh in a series presenting a concise, informative guide on the subject of patents.

By EVERETT G. WRIGHT
Patent Attorney
Detroit, Michigan
Member of the Michigan and Federal Patent Bars

Final Rejection and Appeal

Whenever it is no longer necessary for the examiner to cite new references or new reasons for the second rejection of claims, the second rejection may be and usually is made "final." In other words, if an amendment raises no new issue relative to the merits of the case, the second rejection of the previously rejected claims is made "final." A final rejection is not usually made until after the second office action.

After final rejection, that is, after there have been two rejections of claims as originally filed or as amended, and after all of the claims in the case have been acted upon, and after all interlocutory objections and requirements of the examiner (except a requirement for division) have been disposed of, the applicant may, upon payment of the required fee, appeal from the decision of the primary examiner to the Board of Appeals. The grounds upon which appeal is taken must involve the merits of the invention and must be set forth in writing.

From an adverse decision of the Board of Appeals upon the claims of an application, the applicant may appeal either to the Court of Custom and Patent Appeals in a manner prescribed by the rules of that Court or to a United States District Court in equity.

Allowance, Issue, Forfeiture and Renewal

An appeal allowance of an application is made when it appears that the applicant is justly entitled to a patent under the law, and a notice of such allowance is sent to the applicant or his attorney. The notice of allowance calls for the payment of a final fee of $30.00 and $1.00 for each claim in excess of 20, within six months from the date of the said notice of allowance.

The patent will then issue within a period of three months from the date of payment of the final fee.

The application becomes forfeited if the final fee is not paid within six months from the date of the notice of its allowance.

The renewal of forfeited applications is provided for in *Rule 175* of the Rules of Practice.

> *Rule 175.* When a patent has been withheld by reason of non-payment of the final fee, any person, whether inventor or assignee, who has an interest in the invention for which the patent was ordered to issue may file a renewal of the application for the same invention; such renewal of the application may be filed any time after the case is allowed, and such renewal shall be taken as a waiver of the right to pay the final fee. But any renewal application must be made within one year after the balance of the original application.

Abandonment, Revival, Reissue and Disclaimer

Abandonment of an application may result from (a) an express declaration of abandonment filed in the Patent Office and signed by the applicant and his assignee, if any; (b) the failure of the applicant to complete his application within six months from the filing of the first paper; and (c) improper prosecution of the application after it has been filed.

Revival of abandoned applications may be granted by the Commissioner of Patents on petition accompanied by affidavits stating facts that show the delay causing the abandonment was unavoidable.

An early issue will contain the concluding installment of this series on Patents. Employment contracts, shop rights, rights of employees, rights of patentees and rights of employers will be discussed.—*Editor.*

A.S.T.E. Chapter News

Chicago

Under the leadership of M. A. Blu, manufacturing executive of the Sears, Roebuck Company and T. B. (Bert) Carpenter of the National Automatic Tool Company, plans are under way for the installation and chartering of a Chapter of the American Society of Tool Engineers in Chicago. The first meeting of the proposed Chapter was held October 6th at the Graemere Hotel at which the following Tool Engineers were present: William Abrecht, Tool Room Foreman, American Can Company; Edward F. Bachner, Treasurer, Chicago Molded Products Corp.; M. A. Blu; T. B. Carpenter; Charles Castiglia, Sales Engineer, Hannifin Manufacturing Company; Wade Doty, Sales Engineer, R. E. Ellis Engineering Company; Clifford Ives, Mechanical Engineer; Adrian A. Kooyman, International Harvester Company; E. M. Parre, Instructor in Mechanical Engineering, Lewis Institute; H. M. Reeves, Florence Stove Company; B. F. Rosenberg, Supt., Scully Jones Company, and C. O. Watkins, Sales Engineer, Scully Jones Company, E. A. Kooyman, Asst. Research Engineer, International Harvester Company.

Readers of *The Tool Engineer* and other interested manufacturing executives of the Chicago area are cordially invited to attend the next meeting of the Chicago Chapter which will be held at the Graemere Hotel, November 9th, (Monday) at 8:00 o'clock P. M. Further information, membership applications, etc., may be obtained by addressing Mr. T. B. Carpenter, 2003 Engineering Bldg., Wacker Drive at Wells, Chicago, Illinois.

Cleveland

Since the October meeting came on the last day that matter for publication was received, this column could not contain a review on the subject — Modern Drop Forging in Relation to Machine Shop Practice — given by Mr. R. E. W. HARRISON. However, the December issue will contain a review on Mr. Harrison's talk, together with that of Mr. W. H. Oldacre, the speaker for this month's meeting. His subject will be "Cutting Oils and Lubricants as Applied to Modern Production Methods."

The Cleveland Chapter feels highly honored in having Mr. A. C. Goddard and Mr. W. C. Todd elected to the Board of Directors of the National Body for the coming term.

The Cleveland Chapter has long felt the need of training young men in the field of Tool Engineering and as a result three of our Committeemen are teaching in Evening Schools.

Mr. R. A. Fintz, of the White Motor Co., is teaching Production Planning. Mr. Frank Jeffs, of the Cleveland Universal Jig Co., and Mr. P. F. Rossbach of the Eaton Mfg. Co. Axle Division, are teaching Tool Design.

We wish these men good luck and that the fruits of their efforts will be a real help to society and a pleasure to themselves.

Detroit

Semi-annual National Meeting

From the standpoint of Chapter representation, the semi-annual National Meeting held at the Hotel Fort Shelby, Detroit, might have been considered disappointing but for the progressive and cooperative spirit shown. The day started at 10 A. M., with registration, then, after an informal luncheon, various committees convened, also, the ballots for the 1936-1937 Directors were counted and certified. The new Directorate is listed on title page of this issue.

At 6:30 P. M. some hundred and fifty members, guests and Chapter representatives gathered at the dinner meeting in the Spanish Grill; this number swelled to much large proportions at the entertainment and technical session at 8 P. M. Following a pleasing musical and entertainment program, Mr. Lamb, the Society's president, opened the formal meeting. After a brief introduction of distinguished guests by Mr. Homer Bayliss, Mr. Lamb, President of A.S.T.E. gave a short resumé of the Society's work and aims. Mr. Otto Winter, Detroit Chariman, then outlined coming events; Prof. John Younger of Ohio State University as speaker for the November meeting, Mr. K. T. Keller of the Chrysler Corporation for December and Mr. Cameron of the Ford Motor Company for January — truly a galaxy among speakers. Due to his removal to Toledo, Mr. Winter delegated Mr. Andrew E. Rylander to act in official capacity on matters relating to Detroit Chapter business. Mr. Lamb then introduced Mr. Hiatt, Chairman of Racine Chapter.

Mr. Hiatt, after an amusing opening comment, outlined the organization and work of the Racine territory; he also told of interesting Juniors from an adjacent vocational school. Not only do they have a Junior Engineers' Club, but the Chapter has made arrangements with the local Vocational School authorities to start classes in tool design. Evidently the Racine boys intend to start from the ground up, and Mr. Hiatt declared his intention of taking the initiative in the training of students.

Mr. Fintz of Cleveland was next introduced; like Mr. Hiatt, he outlined the trials and tribulations of organizing the Cleveland Chapter, also, gave a resumé of the work done in that territory. In closing, he extended an invitation to the Detroit Chapter to visit Cleveland. Mr. Hawkey, Secretary of Cleveland was then introduced.

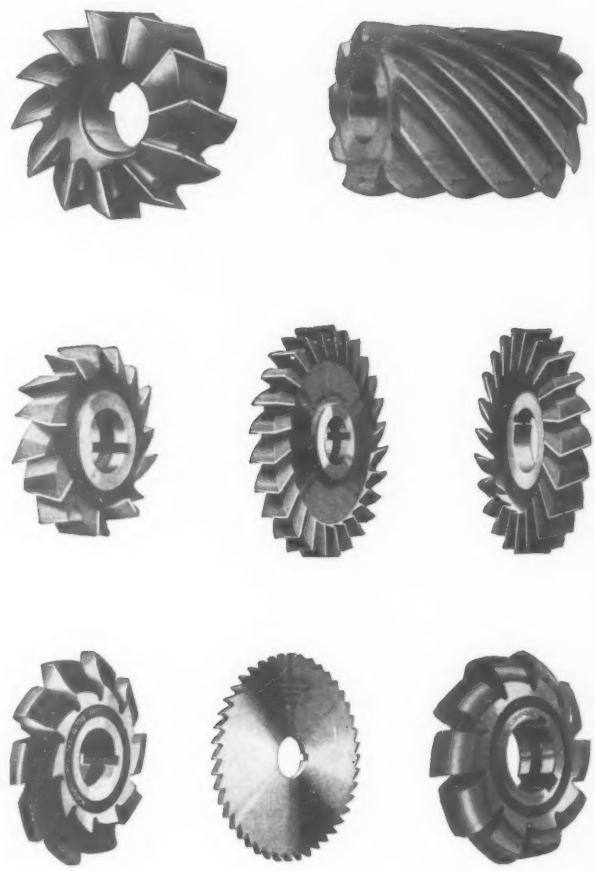
Following the visitors, the several past presidents of the Society (with the exception of Mr. Carpenter, now removed to Chicago) were introduced; Mr. Joe Siegel, Mr. W. H. Smila, (now Chairman of the A.S.T.E. Standards Committee) Mr. R. M. Lippard; also, Mr A. M. Sargent, whose work as Secretary of the Society has been outstanding. Then, in succession, Mr. Frank Crone, National Treasurer, read a report of the financial standing; Mr. Ray Brunner, Ntaional Secretary, followed with a report of Society holdings. Mr. Lamb next outlined procedures of the Society, and read off the list of Directors for '36-'37.

Mr. Smila gave a comprehen-

(Continued on page 28.)

MILLING CUTTERS FROM STOCK

When you want them



Your immediate needs for standard types and sizes of Milling Cutters will be filled from our stocks, located at strategic points throughout the country.

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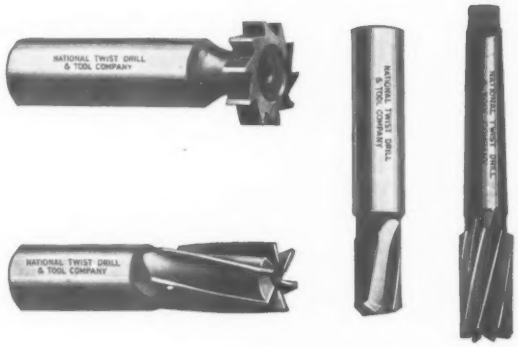

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J & L AUTOMATIC THREAD GRINDING MACHINE

Gratifying, indeed, has been the response to our recent announcement of the J&L Automatic Thread Grinding Machine. And doubly gratifying, because a majority of those responding have been manufacturers who formerly built special purpose thread grinding machines for their own needs. These same manufacturers are now turning to J&L. Why? Consider the number of jobs this one machine can handle: single, double, triple, quadruple, or sextuple threads; straight, taper, double taper, or combination of straight and taper threads (no compensations for lead required). These threads may be ground on either hard or soft material. The machine will grind taps, tap

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"A MACHINE FOR COMPLETE COVERAGE OF ALL THREAD GRINDING NEEDS"

and die chasers, circular chasers, button-type thread hobs, thread hobs without lead, and machine components such as spindles, and lead and feed screws.

And another feature—these jobs may be changed quickly and easily. Pitch changes are accomplished through change gears as quickly as on an engine lathe. The machine is adapted equally well to single piece or production work.

The J&L Thread Grinding Machine is a machine the industry has been waiting for. May we send further information? A new illustrated catalogue is yours for the asking.

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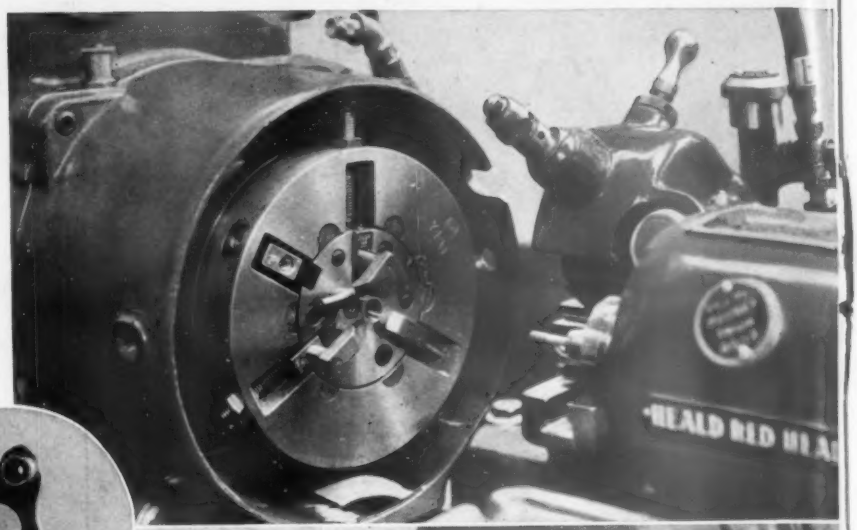
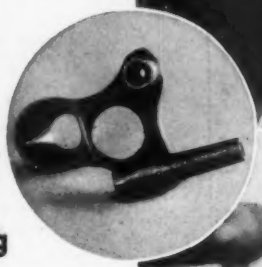
Heald No. 81 INTERNAL GRINDER

The Heald No. 81 Internal Grinder is a small, automatic, extremely fast machine especially designed for grinding small and medium size holes. Its all around versatility is shown in the opposite typical installations. If you have a similar job, let us submit recommendations.

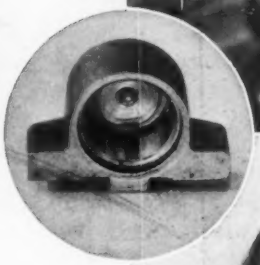


STRAIGHT OR TAPER HOLES



Besides grinding straight holes, the No. 81 can be quickly adjusted for grinding taper holes. This installation shows the grinding of a 19° taper hole in a sewing machine part on the No. 81 Internal with automatic sizing.

BLIND HOLES



Grinding the straight, blind bore in a universal joint trunnion bearing on a Heald No. 81 Size-Matic. The hole is held within .001 removing .020 stock.

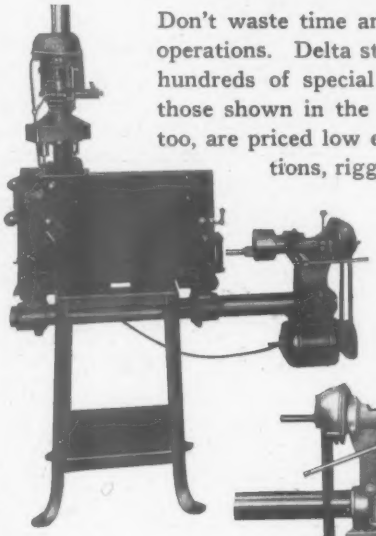
FACING

The No. 81 Internal can also be furnished with a facing attachment for face grinding as shown at the right, for bore and face grinding of steel spacer bushings.

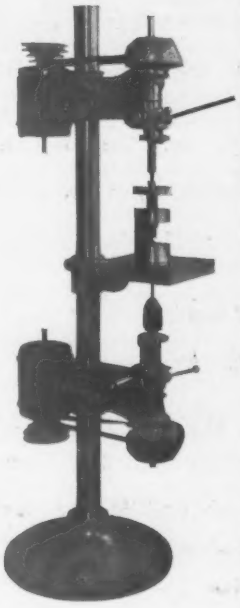
THE Heald MACHINE COMPANY Worcester, Mass.

FOR SPECIAL SET-UPS

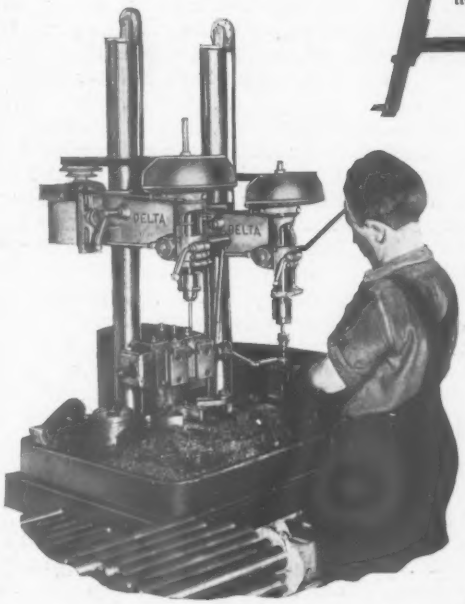
Use "DELTA" Low-Cost Drill Heads



Don't waste time and money building drilling units for special operations. Delta standard 14" drill press heads can be used for hundreds of special purposes in the production shop, such as those shown in the illustrations. Complete Delta drill presses, too, are priced low enough to be used for special drilling operations, rigged up as single-purpose machines and stored in the toolroom when not in use on the line. Alert and progressive tool designers are finding more uses every day for these high-grade, self-sealed ball bearing heads and drills. Investigate their possibilities for yourself.



Note that we furnish only standard drill presses and drill-press heads. We do not build special machines.



New 17 inch DRILL PRESS

The new Delta 17" Drill Press is a revelation in tool value. It is the most modern tool of its kind produced to date, and there is nothing like it on the market at anywhere near its low price. Like the 14" drill press, heads for this tool can be purchased separately and used in special setups. 14" drill press heads furnished in high and low-speed models, ½" capacity. 17" drill-press heads for speeds up to 2240 r.p.m., ¾" capacity in cast iron. Send for literature completely describing Delta Drill Presses.

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MILWAUKEE, - WIS.

Production Perspectives

(Continued from page 10.)

agement in Schenectady. At headquarters in Schenectady it was stated that approximately 40,000 industrial employes of the company are effected by this wage increase. At Massillon, Ohio, the Eaton Manufacturing Company are broadening the operations in their small stamping division. At present a representative line of popularly priced chromium plated kitchen and table ware is being produced at this plant. The Bender Body Company of Cleveland has entered the trailer field. The company has completed its first model, according to vice-president, Theodore Kundtz, Jr., and by December expect to have three models on the market. The Mahoning Safety Coach Company of Alliance, a new concern, has begun work on 14, 16, and 18-foot trailers. Accessories include electric or gasoline stoves and an electrical system which may be plugged into outside service lines. The Coachcraft Company of Millersburg, Ohio, has announced it has completed its financing and will also manufacture a trailer coach. Down in Cincinnati we hear the Westinghouse Electric & Manufacturing Company recently purchased two acres of land on Dana Avenue, Evanston, for approximately $50,000. They will build a modern structure which will take the place of the present headquarters on Elm Street near Third. The improvement is estimated to cost $150,000. The former plant of the Kirgans Arcadia Farms, Inc., in Cincinnati—near Lunken Airport, has been purchased by the Commonwealth Manufacturing Corporation. The latter company manufactures electric welding machinery and electrical and mechanical equipment.

* * * * *

Over at Louisville, Kentucky, we hear the Sheet Metal Products Company has been running full time with considerable night work. They report a brisk demand for utility cabinets, clothes hampers, vegetable bins, kitchen tools, and medicine cabinets.

Pittsburgh District

A busy fourth quarter in Pittsburgh's sheet steel and plate glass industries was predicted by the Commerce Department in Washington. This is based on large orders being placed by automobile manufacturers for both products. Many sheet mills will be completely occupied for the rest of the year. The Blairsville plant of the Schwarzenbach-Huber Company has been sold to the Pittsburgh Store Fixture and Equipment Company for additional manufacturing facilities. Production is expected to begin December 1st and the plant will employ about 150 skilled craftsmen. Preparations are being made for the manufacture of air conditioning equipment. The Westinghouse Club, composed of members of the Westinghouse Electric and Manufacturing Company, has started its 35th year of activity. At a meeting of the club held the early part of October, C. H. Bucher, newly elected president and general manager of the company, was the chief speaker and discussed "Opportunity."

Indiana

From down in Evansville we learn the Chrysler Corporation obtained a building permit for interior alterations to their plant to cost approximately $30,000. In South Bend the Oliver Farm Equipment Company has granted all factory employes a 10% increase in wages, according to officials, because of greater efficiency and economy in manufacturing operations and cooperation of employes. Studebaker officials have announced that mounting orders from all parts of the country has necessitated a weekly production of 2770 cars and trucks which are being shipped on an allotment basis to dealers, and capacity production is expected to be maintained at least until December. The Welch Aircraft Company in South Bend have added machinery and floor space to their plant necessitated by an order for 50 planes. A portion of the old South Bend Watch Company building on Mishawaka Avenue has been taken over. The last load of equipment was moved the middle of last month to the new location. Roy E. Cole has been appointed vice-president of Studebaker in charge of engineering and W. S. James has been selected by Mr. Cole as Chief Engineer. Mr. Cole succeeds Mr. D. G. Ross, whose resignation was announced in this column two months ago. Also from South Bend we hear that the Steel Furnace Manufacturing Company will begin production of electrically welded steel furnaces for home installation. The company is headed by John S. Edwards, who has associated with him Byron Whiteman as plant superintendent. The concern will begin production in the factory building formerly occupied by the Edwards Iron Works, Inc.

Wisconsin

Milwaukee area continues full tilt with mass manufacturing plants operating at former high levels. Cutler Hammer recently announced the extension of manufacturing facilities to the west coast with a ne plant at 970 Folsom Street, San Francisco. R. R. Crooke, who has had more than thirty years experience will be in charge of production at the San Francisco plant, which has been completely equipped with new machinery. The company's plants in Milwaukee are operating at high production rates with a general run of orders from widely varied industries. Outboard Motors of Milwaukee has consolidated with the Johnson Motor Company of Waukegan, Illinois, forming a new company to be known as Outboard Marine and Manufacturing Company. Volume sales of both companies, it is said, has been materially larger during 1936 than in former years. A carload of excavating machinery, the largest single shipment to move over the all-water route to Europe, out of Milwaukee during the present season, was shipped last month by the Harnischfeger Corporation. The shipment was made to Rotterdam, Holland. Waukesha Motor Company have had an excellent demand for engines from a wide field of industrial applications. Supplementing these sales were the company's new lines of air conditioning units for railroads and offices. From Beaver Dam, Wisconsin, we hear that the old plant of Western Malleables, Inc., which at one time employed 1500 men, has an nounced its permanent closing and liquidation. Unfavorable location in respect to sources of demand was given as the principal reason for the closing. In Kenosha the American Brass Company resumed operations October 8th at its plant which had been closed October 2nd, after a dispute between employees and the

(Continued on page 38.)

$2623 INDIRECT SAVINGS with

FIRTHITE

Form turning a cast brass plumbing fixture, 10 inches in length, with a FIRTHITE tipped skiving tool, using a feed of 2½ inches per minute. The exceptional finish has reduced manufacturing costs on subsequent operations.

ILLUSTRATED here is a typical FIRTHITE installation that exemplifies FIRTHITE economy. Because of the superior finish . . . free from tool marks . . . made possible by FIRTHITE, grinding and polishing costs have been reduced from 8½ cents to 3¼ cents per piece. On the first 50,000 parts the user has saved $2,623.00—remarkable economy for a tool that costs only $181.00. Needless to say the tool still has tremendous life since it has been sharpened only twice.

It isn't always direct savings in machining time that make the largest FIRTHITE economies. Naturally, FIRTHITE cuts faster, and faster cutting means more output over a given time . . . a worthwhile saving in itself . . . but how about the many indirect FIRTHITE savings such as smoother finish, better accuracy, less distortion and cost reductions in subsequent operations?

Can we help you analyze your problems?

FIRTH-STERLING STEEL COMPANY

Works: McKEESPORT, PA.

NEW YORK CHICAGO HARTFORD
CLEVELAND DETROIT LOS ANGELES
PHILADELPHIA DAYTON

A.S.T.E. CHAPTER NEWS

(Continued from page 20.)

sive sketch of the work of the Standards Committee; this committee has probably been one of the hardest worked in the Society, considering the great amount of detail work and correspondence involved. Next, Mr. Lippard read off proposed changes in the Constitution and By-Laws; these changes were necessitated by the Society's growth and changing conditions.

A detailed account of the proceedings of the day and evening cannot be presented here; however we have shown the high lights. In all, it was a very successful session, and augured well for the Society's future, especially so since new chapters are in process of formation. The keynote of the meeting was the evident need for an organization of Tool Engineers, as evidenced by the interest shown not only in America, but abroad. As concluding features, a fine moving picture of automobile production in Japan—the Datsun car. Mr. Little of the Nissan Jidosha Kaisha, Ltd., of Japan, announced that the daily output was some 40-50 cars. There was also a motion picture showing the advantages of the American System over the industrial relations policies of other countries.

Following are further high lights of the evening:

Mr. Lamb: "There is no question but what this Society, based as it is—on the promulgation and advancement of the science of Tool Engineering—will continue to grow and develop, and to enhance our profession just as much as its membership wants it to . . ."

Mr. Winter: "Gentlemen, . . . this is a milestone meeting. This is the first National Meeting . . . and I think we can look forward to many more of them as Chapters develop in other cities . . . . The Detroit Chapter realizes that in these other ambitious Chapters we have some serious competition . . . . "

Mr. Hiatt: "Several years ago, down in Indianapolis, a group of us fellows on the board as Tool Designers had an idea that we would organize a Tool Engineering society, but it never developed, and I am mighty happy to know that there is one and that it has grown to the proportions it has now . . . . (at Racine) we have had an attendance of from one hundred to one hundred and twenty-five members and guests to all of our dinner meetings and our first meeting was held last December."

Mr. Fintz: "I come here on behalf of the Cleveland Chapter to pay a debt of gratitude, to the members or to the men in Detroit who are engaged in Tool Engineering. We owe you a debt of gratitude for the simple reason that you have taken Tool Engineering from the gutter and put it on a professional plane where it really belongs,—where it should have been twenty years ago. . . . It has already spread to Europe, with members in Sweden, Russia, France, Holland, etc., which goes to show there is an interest in this particular Society. . . . I knew we were going to have a Chapter in spite of Detroit. . . . I don"t know what it is about Detroit, it just gets me. . . . we came up here on a boat last night. The lake was calm, but the boat was rough. Now, one more thing I want to thank you for. I could easily differentiate between ballots from Racine, Cleveland and Detroit. Naturally we want representation on the Board of Directors. You put us on top. Your ballots from Detroit almost invariably showed you gave us a check—that shows you are thinking about the chapters—it brings out your co-operative spirit."

Mr. Lamb: "A survey by our Industrial Relations Committee shows that we are facing an enormous shortage of skilled Tool Engineers in industry. There is not enough effort being put forth to supply this demand . . . this necessity for absorbing young talent. . . works along the lines of this Society in sponsoring student chapters."

Mr. Smila: (Chairman Standards Committee). "As most of you know, we launched our first Standard Sheets at the Machine Tool Show last fall . . . we had about five or six at that time . . . since that time we have made two million sheets . . . I think we have made fairly good progress . . . and the interest shown has been very great."

Mr. Bayliss: "This is the premier showing in the United States of this film, and we are probably the only Engineering Society which will see these pictures."

Milwaukee

Milwaukee's A.S.T.E. Chapter held its regular October meeting Thursday evening, October 8th. A very interesting "Around the Blackboard Discussion" opened the technical session with Chairman George A. Smart beginning the discussion with a talk on carbide tools, costs and methods of brazing. Diagrams were used on the blackboard to illustrate certain points during the discussion and a number of members and guests present participated. Following this portion of the technical program an excellent lecture was given by Mr. Francis P. Bowman, Mr. B. W. Work and Mr. W. T. McCargo of the Carborundum Company, Niagara Falls, New York. These gentlemen traced the history of various applications and methods of the manufacture of abrasives. Following this interesting lecture four reels of motion pictures were shown illustrating various phases of the abrasive industry and uses of abrasive products. This was followed by further discussion with questions from the audience answered by the speakers.

The meeting was adjourned at 10:15 p.m. at which time a buffet luncheon was served.

Racine

Opening their season's program, the Racine Chapter of the American Society of Tool Engineers met in Kenosha October 9th for the joint purpose of making a tour of the Nash Motors Company plant and also of holding its regular dinner meeting. The membership consists of tool engineers, both of Racine and Kenosha, and more than one hundred attended the meeting.

Following the tour of the Nash plant, starting early Friday afternoon, a dinner was held at the Elks Clubhouse. Speakers at this dinner included D. M. Averill, General Works Manager of the Nash plants; Russell Mainland, Assistant General Works Manager; and W. G. Careins, Manufacturing Engineer.

At the close of the meeting, an open discussion was held at which time a number of questions were answered by Mr. Mainland and Mr. Careins.

A number of cylinder blocks and other parts in various stages of operations were on display.

For

SMALL

HOBBING

Use Barber-Colman No. 3 Hobbing Machine

No. 3 PRECISION—For small gears and forms requiring extreme accuracy, use Barber-Colman No. 3 Precision Hobbing Machines. They have a guaranteed accuracy of not more than .0006″ cumulative error between non-adjacent teeth on a 4″ pitch circle. An extra large index worm; close tolerances, and extra care in scraping bearing surfaces and slides, fitting component parts, and setting spindle bearings makes these machines unusually accurate—enables them to maintain close limits consistently on high-production work.

No. 3 STANDARD—For similar work to average commercial limits, use Barber-Colman No. 3 Standard Hobbing Machines. In operating features, range and general specifications the machines are the same. They handle jobs up to 5″ diameter by 7″ face and 12 diametral pitch or equivalent. For best results with both machines, use Barber-Colman Hobs.

COMPLETE SERVICE—Barber-Colman hobbing service is complete, including Hobbing Machines, Hobs, Hob Sharpening Machines, Engineering and Inspection Services. Investigate. Use our engineering service as your own; there is no obligation to buy, no high pressure to sell, we present only the facts for your decision. Send drawings and data for reliable cost and production estimates.

BARBER B-C COLMAN

PRODUCTS

MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

Letters

GRAND TRUNK WESTERN
RAILROAD COMPANY

Battle Creek, Michigan,
October 16th, 1936.
File 3400.

Gentlemen:

In reading your very interesting numbers of "The Tool Engineer," I find an article on "Temperature Control" in October issue by Mr. R. A. Holt, A.S.T.E., and am asking if he might be my old shop mate Dick Holt with whom I worked as tool maker in Peterboro, Canada, in the year 1900.

Having lost track of him, would like to pick him up again and renew old associations.

Yours truly,
M. H. Westbrook,
MHWestbrook/b Shop Superintendent.
P.S. Whether he is this man or not I enjoyed his article and agree with his conclusion.

M.H.W.

Mr. R. A. Holt, member A.S.T.E. who wrote the article, referred to by Mr. Westbrook in letter reproduced above, we are sorry to say is not the party Mr. Westbrook knew way back in 1900. We have asked Mr. Holt to write you Mr. Westbrook—no doubt interesting discussions of this subject will carry on between you.—*Editor.*

October 20, 1936.

The Tool Engineer,
2842 Grand Boulevard,
Detroit, Mich.

Dear Sir:

After looking over the data sheet on page 22 of the September issue of The Tool Engineer, I do not agree with the figures given for the drop.

I find the figures are given for .002 limit.

I have made other notations on the sheet and am enclosing it. If this is incorrect I think it should be republished because it is a very handy sheet.

We use it for taper plug gages.

Yours very truly,
Louis A. Jacob,
Member of the
Cleveland Chapter
(The Cleveland Tractor Co.)

Thank you for calling this to our attention, Mr. Jacobs. I believe if we had stated in the upper left hand corner of the chart under "Example"—"If the taper is .600 per foot and the limit on the hole is .004 *for half of the diameter . . .* " you would not have found any of the figures given in the chart in error. If you will check again, on this basis, I am sure you will find them correct.—*Editor.*

Bridgeport A.S.T.E. Branch to Be Installed Nov. 12

Just as this page goes to press comes word that final arrangements have been made for the Chartering and installation of a Chapter in Bridgeport, Conn., November 12, at 7 p.m. at the Stratfield Hotel.

All Tool Engineers of the district are cordially invited to attend.

New Equipment

Scully-Jones and Company, Chicago, Illinois, who have supplied the trade for several years with standard high quality production tools, are now producing a line of special tools, such as, special reamers, core drills, counterbores, combination tools, boring bars, grooving tools, underneath spot facing tools, tap chucks, drill chucks, driving bars, floating holders, adapter assemblies, sleeves and sockets, compression chucks, magic chucks and collets, facing heads, stellite cutting tools, lathe centers and numerous others. This gives the machine builders the complete set-up of tooling and engineering for their particular requirements.

This assistance has been a great help to the machine builders in recent years as the rapid demand for equipment forces them to install their product complete with a guarantee of production.

Hannifin Manufacturing Company, Chicago, Illinois, has delivered to a prominent manufacturer of metal products a **new type of high speed portable hydraulic punch** for semi-automatic handling of a range of punching operations. This portable unit weighs 59 lbs., and has a capacity of 17½ tons. Dies are interchangeable, providing for punching holes of various diameters up to ⅞ inch in drawn and formed parts of sheet steel up to 10 gauge. The yoke is provided with shoulders for attachment of an adjustable stripper for automatic removal of shells of various depths. The operating cycle is approximately 2 seconds.

A push button on the handle of the punch controls the entire operation of the unit. Exclusive safety features are provided. The punch will not repeat, but completes one cycle and stops. Release of the control button at any point during the operating cycle provides an instantaneous safety stop, with automatic return to starting position.

A tap chamfering fixture for sharpening any size and type of tap up to and including 1¼ inches, irrespective of number of flutes or shank length, is **announced by Detroit Tap and Tool Company, Detroit,** Michigan. The use of this type of fixture insures, in the regrinding of taps, that they will be concentric with the shank and also eliminates difficulties in tapping arising from inaccurate flute spacing in regrinding. Spring collets are used to hold and locate the tap in the fixture. This insures concentricity and eliminates difficulties in sharpening taps on which center holes have been ground away.

Fixtures can be mounted on any type of grinding machine in either a right or left hand position and are adjustable for height. The amount of eccentricity or relief may be quickly regulated by a graduated adjustment on the fixture.

The fixture is completely universal in character permitting the quick sharpening of all taps including taper, plug, and bottoming types.

The R. K. LeBlond Machine Tool Company announces a brand **new Tool Room Lathe**—"brand new in design and performance." Important features of the new machine are: Improved simplified apron of double wall box type construction with one control for both longitudinal and cross movements and one shot lubrication. Efficient tailstock with extra long spindle having a full length bearing in the tailstock even when well extended. Hand wheel at an angle gives ease in operation. Automatic length stops in both directions. Extra deep well braced bed with compensating front way construction giving much greater bearing surface than the old inverted vee. 56 quick changes of feed from .0013" to .166". 56 quick changes of thread from 1½ to 184 threads per inch. Multi disc driving clutch and brake. Multi vee belt drive. Anti-friction thrust bearings on both ends of leadscrew. Automatic lubrication—filtered oil—sight feed indicator gives visual check on the oil at all times. Separate drive for lead screw and feed rod. No swinging plates or troublesome and noisy tumbler gears, only three gears from head to feed box. New standard spindle nose for rapid, accurate and positive placement of chucks, face plates and fixtures. Improved taper attachment. Deep chip and lubricant pan. Apron control to both spindle and feed reverse. Easy shifting quick change feed box with all shafts on anti-friction bearings. Further data may be had from the R. K. LeBlond Machine Tool Company, **Cincinnati,** or *The Tool Engineer.*

ENGINEERED PRODUCTION
EXAMPLES FROM THE SUNDSTRAND FILES
No. 3628

Lathes
Milling Machines
Tool Grinders
Centering Machines
Balancing Tools

Sundstrand Again Improves Machining of Motor Stators

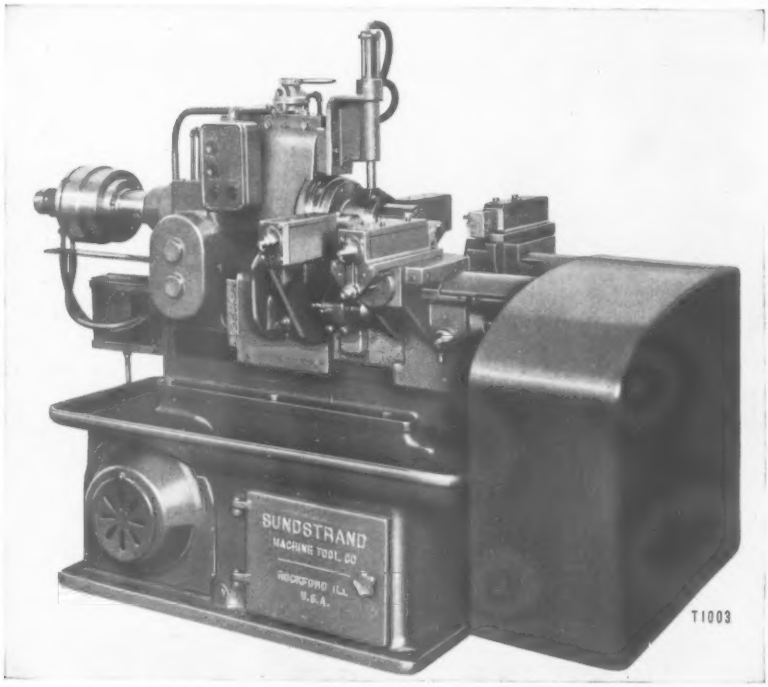


Fig. 1 — Sundstrand Hydraulic Stub Lathe for boring, facing and chamfering motor stators.

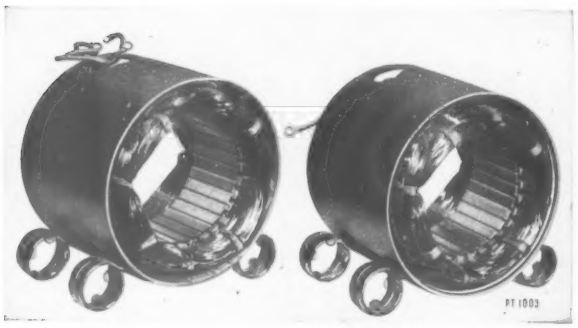


Fig. 2 — Motor stator before Stub Lathe operations, at left; after turning, at right.

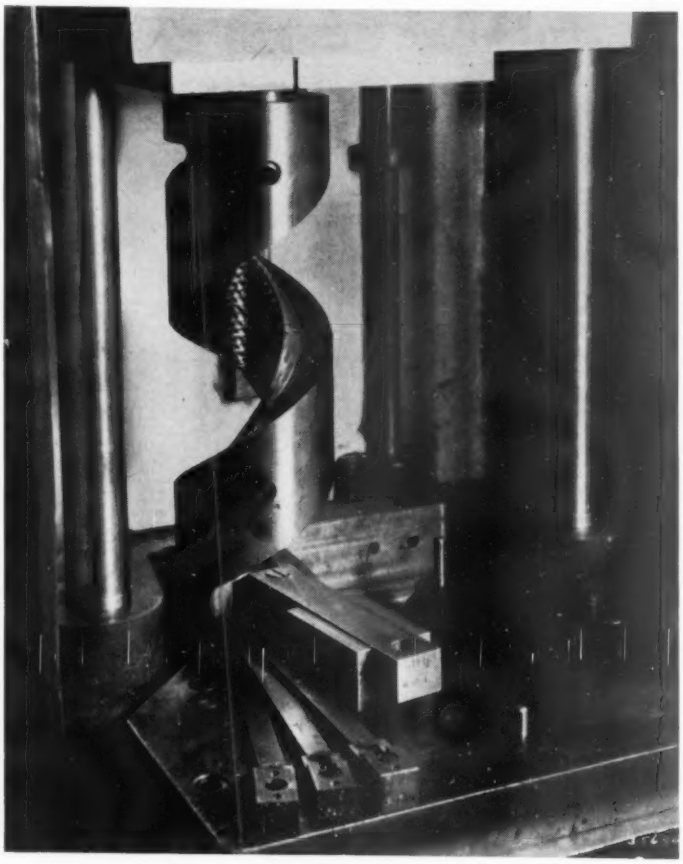
Sundstrand Engineered Production has made progressive improvements in machining motor stators, has supplied leading manufacturers with many machines for this work. Now comes the application of Sundstrand Hydraulic Pumps, Valves and Controls to Stub Lathes machining stators. Result—faster rapid traverses, smoother operation, longer tool life, easier set-up, simple adjustments instead of making cams. One of these Stub Lathes is shown in Fig. 1; a stator, before and after machining, in Fig. 2. Operations are, rough and finish bore rabbets, rough and finish face ends, chamfer outside corner on both ends. Concentricity between bore for armature and rabbets is held within .001″. Groups of tools on two rear slides rough, two front slides follow closely to finish, all slides then rapid return and machine stops, completing its automatic operating cycle. Right-hand front and rear slides have rapid hydraulic movement for loading clearance. All tool slides have micrometer adjustment. Cover on pneumatic driver protects stator windings during machining. Universal driver with adapters handles 14 stators of different diameters and widths, a substantial saving. Production is high—figures and other data supplied promptly on request. Sundstrand Engineered Production is constantly making improvements in machines and methods for turning and milling. Investigate. Send drawings and data for reliable estimates on your work.

SUNDSTRAND MACHINE TOOL CO.
2532 Eleventh Street, ROCKFORD, ILLINOIS, U. S. A.

RIGIDMILS - STUB LATHES
3-Wheel Tool Grinders - Centering Machines
Hydraulic Operating Equipment - Special Machinery

This Month's Cover

THE picture on *This Month's Cover* illustrates a broaching operation representing an outstanding example of what is possible when the manufacturer of a product calls in a machine or cutting tool manufacturer to help him in his design and production problems. The operation shown consists of broaching worm wheel teeth on a window regulator sector. The broach was developed by Colonial Broach Company, the machine being a standard Colonial "Utility" broaching machine with a spiral driving head.



It was desired to provide a worm operated mechanism for steel casement windows on a large production basis. This required that the ten teeth on the sector should have a spiral lead. The operation was virtually impossible on a milling machine. The close tolerances, tooth form specifications, production requirements, etc. mitigated against any other method of production.

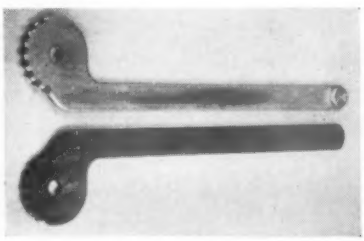
It will be noted that the fixture designed by Colonial Broach for this operation is extremely simple in character. Three sectors are broached with each broach at one time, the three pieces being held with a single clamp. Broaches conform to the spiral broach holder and are produced in removable segments. Actually the machine is equipped with two helical broaches, a right and a left hand so that six sectors can be broached from the rough at one stroke. With this set-up a production of 200 pieces per hour is made possible.

While the appearance of the broach is quite unusual, it is just another example of the hundreds of special broaches which are designed every year by Colonial Broach Company for specialized production requirements. In broaching, more than in any other production process, tool design is the key not only to the entire process, but also to the design of the part itself. Even the design of the machine depends largely on the design and operating characteristics of the broach and the job the broach has to do. Broaching differs from most standard production methods in that a vast amount of engineering and production knowledge is required in selecting and designing broaches for the particular purpose to which they are to be put.

That is probably the main reason why companies like Colonial Broach Company have become so important from the standpoint of consultants in design and manufacture.

With the rapidly increasing interest in broaching, particularly as replacing the more costly milling and shaping operations, manufacturers are turning to the broaching industries to help them in adapting their particular product designs to this faster and more economical production process.

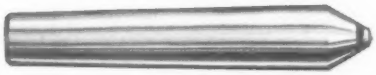
Photograph at the left shows a close up view of the spiral broach and the fixture which holds the three window regulator parts. The operation consists of broaching worm wheel teeth from the rough. Three pieces are broached at once.



How Much Better?

(LABORATORY DRY TEST)

CARBON STEEL — 20 MINUTES



18-4-1 H.S. STEEL — 1 HOUR - 45 MINUTES

S.J. RED HEAT STELLITE — 11 HOURS - 30 MINUTES
(Center Still Serviceable)

Scully-Jones **PRECISION CENTERS** will not
BURN — PICK UP — SCORE or RING

Order Now

Scully-Jones Inserted Red Heat Stellite Centers
"We guarantee the performance of this tool"

SJ6 SCULLY-JONES & CO. SJ6

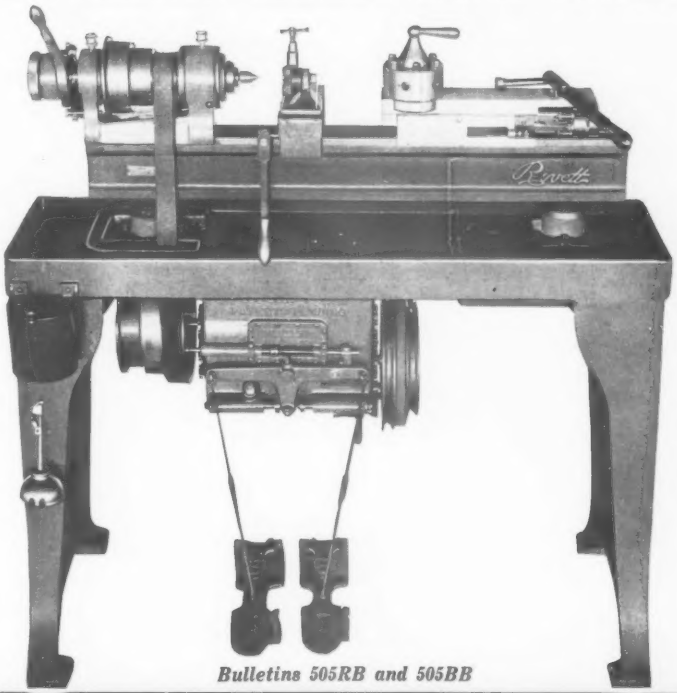
1901 SO. ROCKWELL STREET CHICAGO, ILLINOIS

RIVETT ANTI-FRICTION SPINDLE BENCH LATHES

BALL BEARING and ROLLER BEARING

The earning power of an anti-friction bearing lathe with speed Box Drive may well be twice that of an old type counter or jackshaft driven unit. Spindle is trouble proof under continuous operation. Speeds are: Ball Bearing, maximum 4600 r.p.m.; Roller Bearing, maximum 2300 r.p.m. Endless driving belt is replaceable in one minute. Motor runs continuously. Brake is automatic and stops spindle instantly.

Double production—no lost time.



Bulletins 505RB and 505BB

RIVETT LATHE & GRINDER INC.

BRIGHTON
BOSTON, MASS., U.S.A.

NOTICE! CHANGE OF ADDRESS

A.S.T.E. In New Quarters

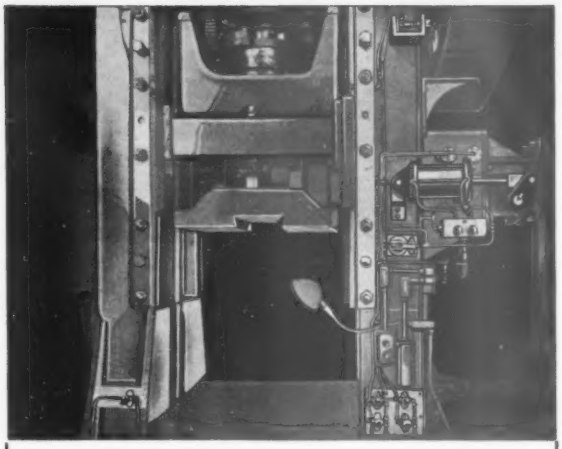
5928 Second Blvd., Detroit. Tel. MA 0649

Hours 9 to 12:30—1:30 to 5:30

The American Society of Tool Engineers has removed from its former offices at 31 Melbourne Ave., to 5928 Second Boulevard, a move occasioned by the continued growth of the Society which has made larger quarters necessary, and also the growth of the Pioneer Engineering and Manufacturing Company which made it necessary for them to require the space formerly occupied by A.S.T.E.

While the officers are proud of the new, larger headquarters, there is a feeling of strangeness due to the change from old associations. The Society work has been carried on at the old address since its inception, and the good fellowship engendered by men working together for a common cause includes memories of both time and place. When we think of Society work we also think of the place of the work and the old address will linger in our memories.

It is gratifying that the Pioneer Engineering & Manufacturing Co., which has provided quarters for the young but robust A.S.T.E., has grown and prospered so as to require the space we formerly occupied. Yet it is but natural that the Society, having grown up, should require a home of its own; however, old associations and the home of its youth and early struggles will always be remembered pleasantly. Now, as before, we continue to grow.



SAFETY OPERATING SYSTEMS FOR PRESSES—

The safe operation of presses is now being efficiently accomplished by the use of HOPKINS AIR OPERATED REMOTE CONTROL VALVE SYSTEMS. Its versatility in application allows for countless varieties of installations. One to meet every need. These systems are for use as automatic or semi-automatic controls for other machines as well as presses. May we send you our Bulletin describing these systems?

THE TOMKINS-JOHNSON CO.

624 N. Mechanic St. Jackson, Michigan

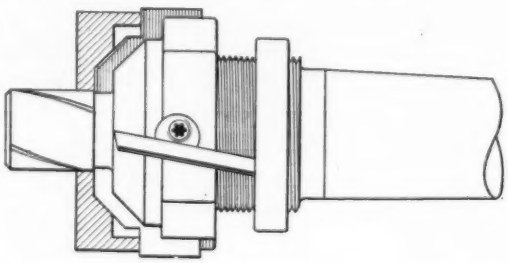
Detroit Representative Haberkorn & Wood

If You Design or Use Special Purpose Tools Engineered to the Job

Send for McCrosky Bulletin 15-F

Showing special inserted-blade tools engineered by McCrosky from customers' work prints. Each special-purpose tool showed improved performance on a definite job and the majority cut costs by combining operations. They will point the way to similar improvement and savings on your own jobs.

One of 35 Special Serrated-Blade Combination Tools Shown in Bulletin 15-F.



Combination Boring, Chamfering, and Facing Tool. Serrated blades locked with McCrosky JACK-LOCK Wedges. Your copy of Bulletin 15-F will show you many other special purpose JACK-LOCK tools designed for a wide variety of operations.

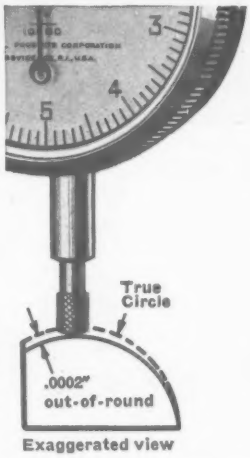
Inside View of JACK LOCK Wedge Patented

Bulletin 15-F shows many serrated-blade tools using McCrosky's JACK-LOCK Wedge. This wedge eliminates the usual hammering required to lock and unlock serrated blades. Tightening the set-screw in the wedge lifts the wedge LIKE A JACK, forcing it over against the blade with a powerful compound wedging action. Retracting the screw releases the positive grip on the blade.

The variety of special-purpose JACK-LOCK Tools shown in Bulletin 15-F illustrates how easily the compact wedge can be adapted to special applications.

McCROSKY TOOL CORPORATION, Meadville, Pa.

Sales Offices in Detroit, Cleveland, Chicago, Philadelphia, Syracuse, Tulsa, Los Angeles



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Because—

Greater Accuracy
Greater Durability
Greater Speed
Less pressure required
They repeat

In a case such as illustrated it is easy to understand how friction could hold back the point from following the surface. This is only one example of the value of the Federal Low-Friction Indicator. With it you will discover defects which now cost you money. It catches defects which now show up too late in production. They have already proved their value in actual use.

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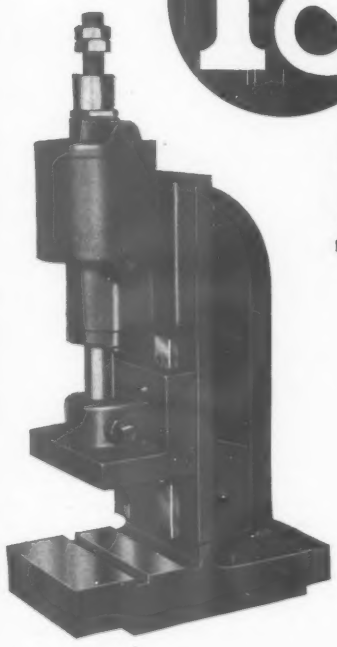

One single press proved so satisfactory and profitable that an entire battery of eighteen was installed.

Specifications: 1 ton capacity with 80 pound air line, overall height 28½", platen 7 x 7½", ram opening 3½", stroke 2" adjustable. Unequalled for light stamping assembly and forcing operations—arranged for close grouping. (See illustration.)

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LOGANSPORT - - - - - INDIANA

Each has its own enthusiastic following

Perhaps no better proof of the sound engineering principles always applied to the manufacture of O. K. Tools exists than this: that new designs rarely obsolete previous models entirely. Here are two interesting cases in point.

SHANK TYPE

This sturdy holder with round shank bit, representing over 30 years' development, is still in regular demand where the work does not require the flexible bit adjustment of the present-day design. Hence, these original tools are always in stock. In this type, the bit drops naturally into true cutting position, where a turn of the wrench secures it as solidly as though bit and holder were one solid piece!

SHANKLESS TYPE

In the new model, shown at the right, the bit has a serrated under-face, which meshes with serrations in the seat of the holder. By loosening the locking clamp, bit may be moved sidewise, to compensate wear.

All O. K. Tool Holders are of alloy steel. The bits are of high speed steel, and are available for all metal cutting jobs. Further details on request.

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SHELTON, CONN.

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OF INSERTED-BLADE METAL CUTTING TOOLS

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A Starrett No. 665 Dial Test Indicator and a Starrett No. 567 V Block make an ideal combination for production inspection of a wide variety of parts.

They are equally useful for unit operations. The Block, a new Starrett development, is furnished with a forged clamp which can be used to hold shouldered studs, pins, etc. for light milling, drilling and grinding. The Dial Test Indicator can be used on the base as shown or in the tool post of a lathe.

Starrett Revised Catalog No. 25 "T" and the Special Starrett Dial Indicator Catalog illustrate and describe a complete line of Starrett V Blocks and Dial Indicators. Write for them.

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World's Greatest Toolmakers
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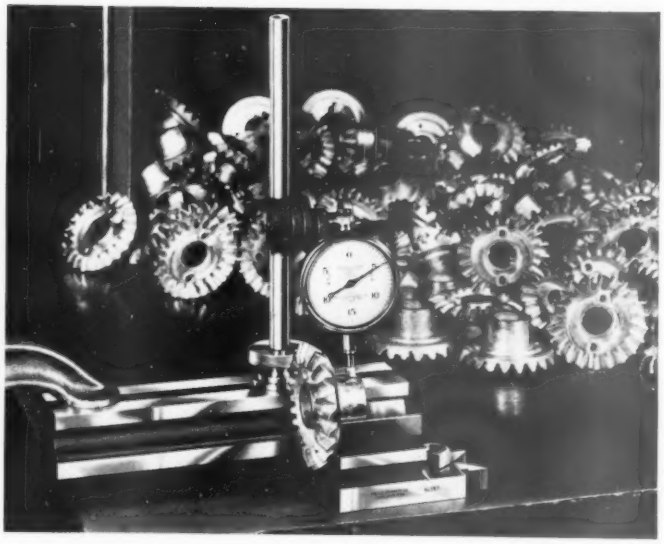

Starrett No. 665 Dial Test Indicator and a Starrett No. 567 V Block set up to check the hub diameter of bevel gears.

Starrett Dial Indicators

Handy Andy's Workshop

(Continued from page 15.)

Saw a lot of the boys that I have been missing of late, at the October dinner. M. A. Atlas, Al Nancarrow, John Nelson, Ed. Beyma and Auge Ketelsen among others. Ivar Eklund of Midland Steel was there, too—and you come often, Ek.

♦ ♦ ♦

I caught a glimpse of Mr. Henning Freden, Secretary of the Swedish Engineering Society, among the dinner guests. Come often, Mr. Freden—*and as a member.* This is an *invitation.*

And our guests from the land of the Mikado — Messrs. Little, Osaka, Kubota and Otake of the Nissan Jidosha Kaisha (Japanese Motor Manufactury) may they face the rising sun with friendly memories of their brother engineers of the A.S.T.E. We shall remember them.

♦ ♦ ♦

I nominate Dave Forsman to a niche in the A.S.T.E. Hall of Fame. I know that Dave has done a lot for the Society, but what I like best about him is his loyalty to his friends—and the way he fights for them, in a pinch. Take a bow, Dave.

♦ ♦ ♦

If anyone has ever doubted the importance of *The Tool Engineer* as a promulgator of A.S.T.E., the talk by Mr. Fintz should dispel all doubt. This Journal, and its live publisher, Roy T. Bramson, were very largely instrumental in starting the Cleveland Chapter. And by the way, we are greatly pleased with reader comment about *The Tool Engineer.* It is becoming known throughout the country as a real engineering journal.

♦ ♦ ♦

A tip to "Geddie". Your stuff is good, but don't be so modest. Come across with your name and we'll print it. After all, how do we know it's your *thunder*—not an echo?

♦ ♦ ♦

I am on the Directors now, thanks to a lot of the boys who voted for me. I consider it a real honor, having been quite impressed with the high character and common sense of that body. What I really had in mind was this: that due to the work of the directors and the Executive Committee in ironing out the various problems of the Society, our meetings function smoothly and pleasantly. We have time for our guests, to hear messages of importance and to enjoy an evening with our friends. It makes for a better—a friendlier spirit.

♦ ♦ ♦

Mr. O. B. Jones, of the Detroit College of Applied Science, sent one of his boys, Stanley Sikorski, to help out during the activities of Oct. 8th. Perhaps the young man enjoyed mixing with the Seniors; we might reciprocate by visiting the Student Chapter some evening. How about it, young fellers?

♦ ♦ ♦

From one thing to another—but the wife's just pouring the coffee, and you know me. I'll see you next month.

H. A.

JOE'S UP IN THE AIR AGAIN!

And who wouldn't be—with these pesky pins that don't fit. Get 'em halfway in and they're stuck—and so are you! *Try* and get 'em out! It's good economy to spend just a few more pennies and be sure of the accurate fit you get with Genuine Danly Dowel Pins.

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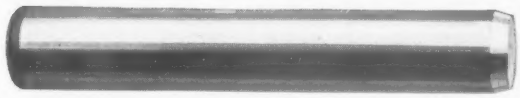

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DANLY DIE MAKERS' SUPPLIES

Milwaukee Firm Changes Name

W. G. Nichol Company, Milwaukee, has changed its name to Nichol Machinery Company, effective November 1, 1936. The change in name involves no revision in management or location and is made to identify the company more closely with the product it markets.

New Machine Tool Builder in Detroit Announced

Charles French of the Sterling-French Machinery Company, Detroit, has announced the formation of a new company to engage in the manufacture of special drilling equipment — for drilling, reaming and tapping operations. Mr. French will be president of the new firm, Dave Forsman will be Sales Manager and Max Clark will have charge of manufacturing operations. The new firm will be known as the Partool Machine Company.

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Production Perspectives

(Continued from page 26.)

American Brass federal union No. 19322. **Douglas C. Rowell,** former manager of the company's plant at Toronto, **arrived in Kenosha** October 5th **to become plant superintendent,** succeeding **Russell M. Tree,** who has **taken a position with a Michigan steel company.**

Bridgeport, Connecticut to Have A.S.T.E. Chapter

Bridgeport, Connecticut will, no doubt, be the next city to establish a branch chapter of the American Society of Tool Engineers. This will be the first chapter of the Society to be established east of Cleveland, Ohio.

Mr. Ben Page of the Standards Department of the Bullard Company in Bridgeport became interested in the organization of a branch in the Bridgeport area, sometime ago. Recently he took an active part in bringing Tool Engineers of Connecticut together for a preliminary meeting which was to be held October 22nd at the Obeh Grotto Home in Bridgeport. Invitations to Tool Engineers from all sections of Connecticut were sent out from Detroit Headquarters of the Society.

National Officials will, undoubtedly, be called upon in the near future to come to Bridgeport to grant the charter and formally install the new branch. All A.S.T.Eers join in wishing this group success in their organization activities and congratulate Mr. Page and his associates in this worthy undertaking.

The LeBLOND
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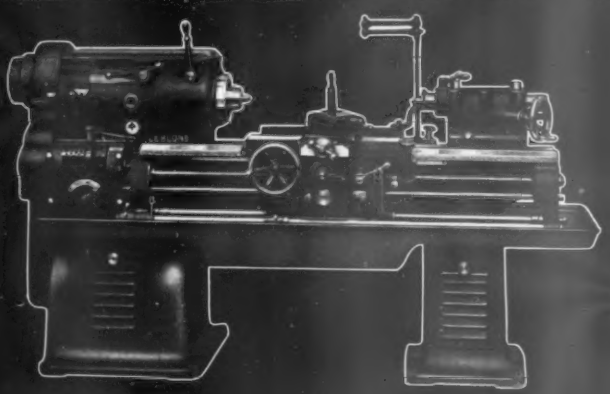

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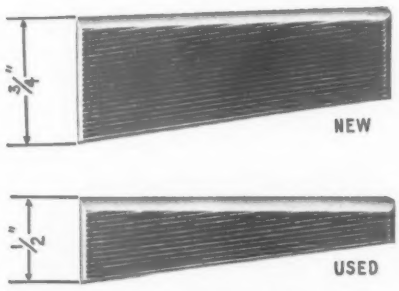

Inserted reamer blades
No. K7 Actual size

G&G CAM LOCK REAMERS

Note that the length has not changed, all the stock removed from the used blade was utilized to replenish the diameter for resharpening, and adjustments can be as small as desired (no portion has been ground away because of excessive overhang).

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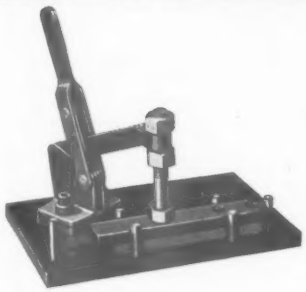

TWELVE *different* STYLES *and* SIZES

In this illustration is shown a cold drawn steel bar held in place for drilling and reaming operations by the pressure of De-Sta-Co Toggle Clamps. This job was designed for small quantity production and the top plate in the nest has been hardened to act as a master drill guide.

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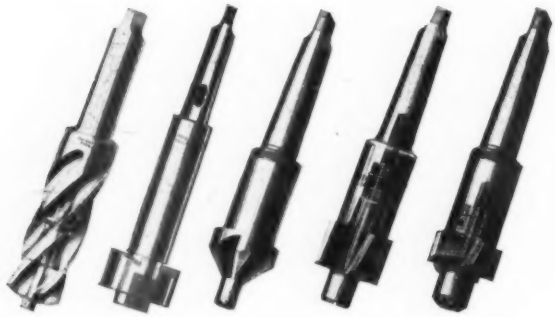

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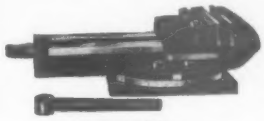

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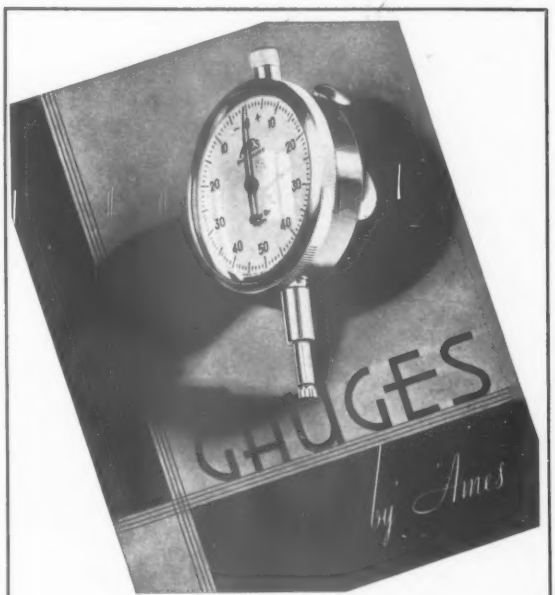

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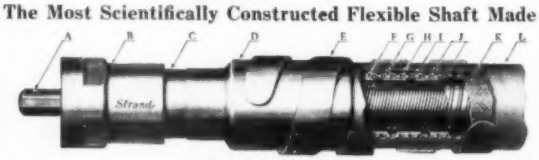

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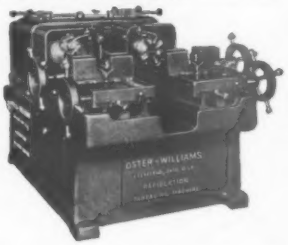

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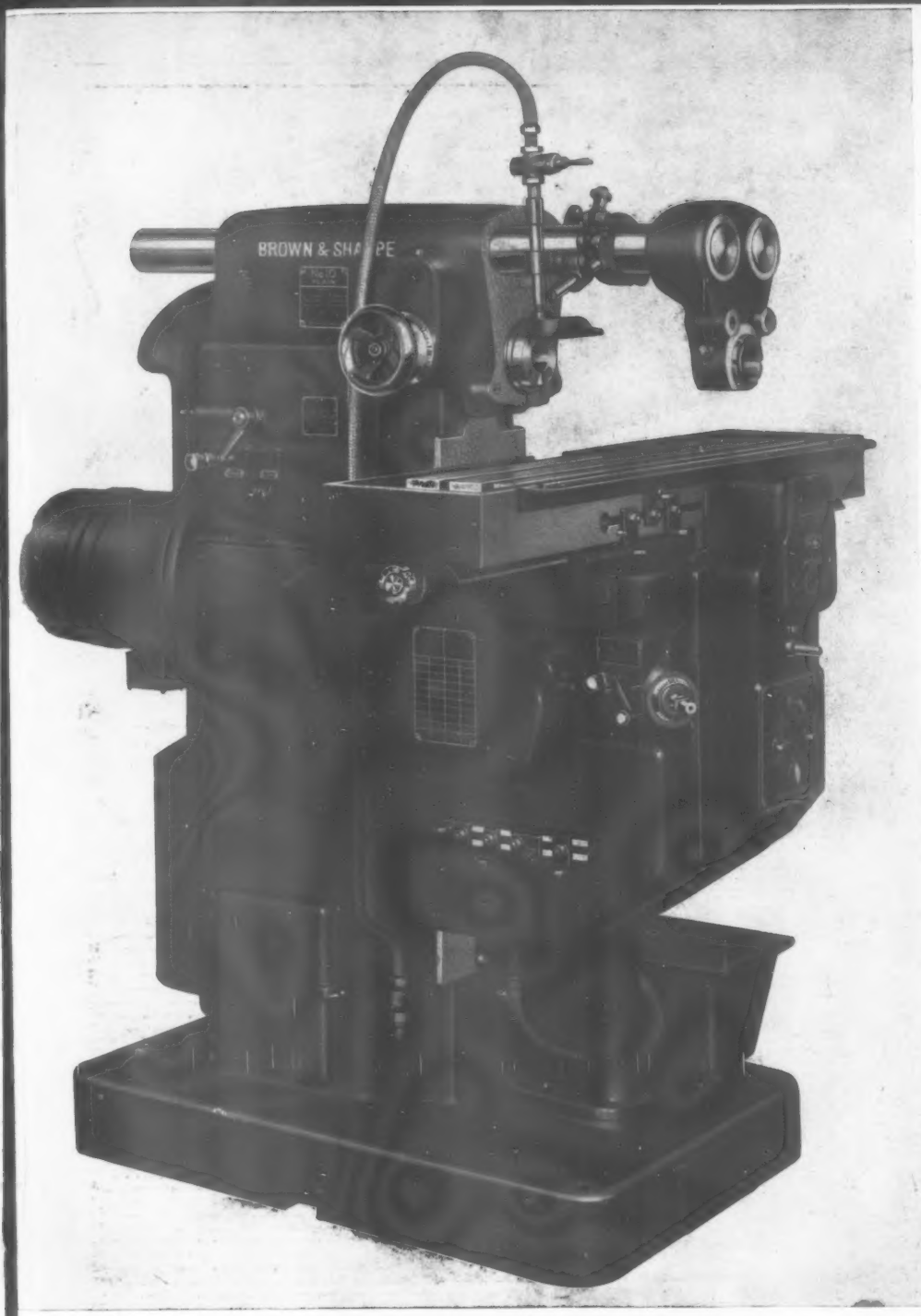

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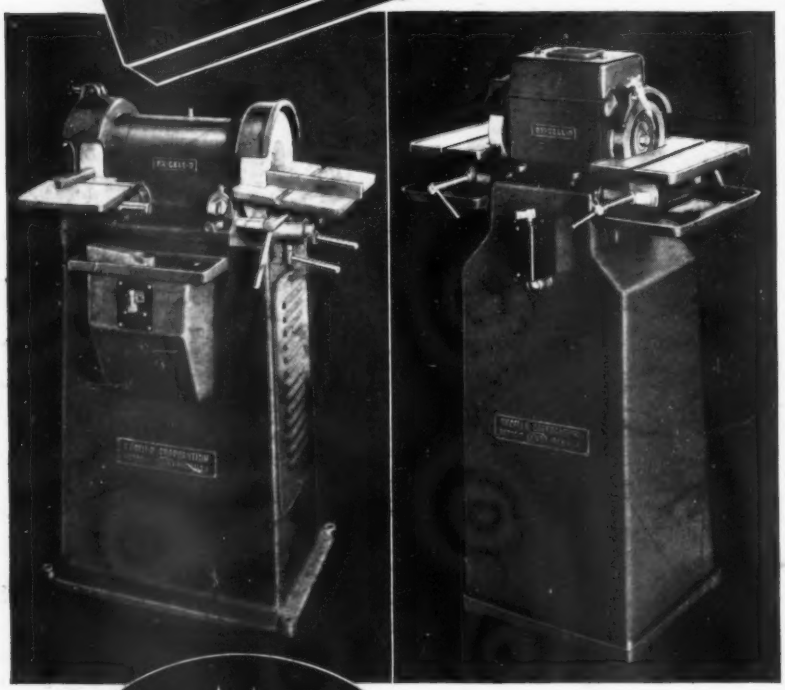

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